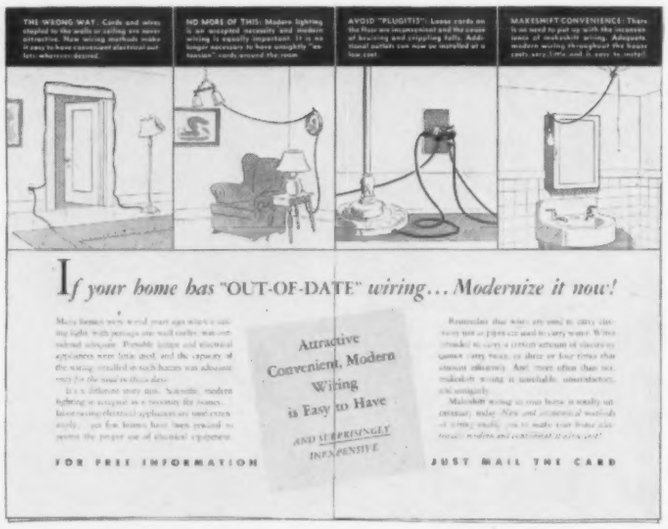
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

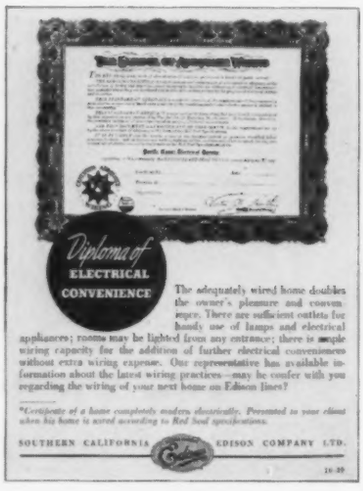
W-HILL CO.
ALIFORNIA

NOVEMBER, 1940

25c a Copy


THE WRONG WAY: Cords and wires stapled to the walls or ceiling are never attractive. Now wiring methods make it easy to have convenient electrical outlets wherever desired.
NO MORE OF THIS: Modern lighting is an accepted necessity and modern wiring is equally important. It is no longer necessary to have unsightly "extension" cords around the room.
AVOID "PLUGITIS": Loose cords on the floor are inconvenient and the cause of bruising and crippling falls. Additional outlets can now be installed at a low cost.
MAKESHIFT CONVENIENCE: There is no need to put up with the inconveniences of makeshift wiring. Adequate, modern wiring throughout the house costs very little and is easy to install.
If your home has "OUT-OF-DATE" wiring... Modernize it now!
Attractive Convenient, Modern Wiring is Easy to Have AND SURPRISINGLY INEXPENSIVE
FOR FREE INFORMATION
JUST MAIL THE CARD

Adequate Wiring Essential to Modern Homes
LET'S VISIT SOMEBODY WITH AN ELECTRIC COOLER TODAY...
Thirty Days Hath September and They're All Likely to Be Hot!



Developing a Bigger Appliance Market

Edison advertising helps create a bigger appliance market by promoting adequate wiring for both old and new homes in Edison territory. Constant publication advertising, supported by direct mail, tells the story of modern electrical convenience . . . sees that there is a place for every electrical appliance in every home . . . prepares the way for maximum appliance sales.

SOUTHERN CALIFORNIA ALL-WINTER SUN FESTIVAL

SOUTHERN CALIFORNIA Edison

11-40

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), November, 1940. Vol. 85, No. 5. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
Copyright, 1940. McGraw-Hill Company of California.

NEW Fuse Links Rated

51-52-101-102

Amperes

to cut fuse co-ordination costs

PERMIT USE OF SMALLER CUTOUTS
SAVE UP TO $5 PER INSTALLATION

WHEREVER your co-ordination studies show that a 75- or 100-amp fuse link is needed and that a 50-amp cutout has the necessary interrupting and load-carrying capacity, you can now use this smaller and *lower-cost* cutout with a *51- or 52-amp fuse link, instead of being forced to use the 100-amp cutout. And every time you can do this, you *save about five dollars in cutout costs.* (You save twice this much on a similar application of the 100-amp cutout using the 101- or 102-amp fuse links in place of 150- or 200-amp links.) And of course, these new co-ordinating fuse links have all the inherent reliability — all the built-in engineering — of the family of standard G-E fuse links.

The famous "stethoscope" test. The resistance of cable-type fuse links is checked to the last .001 ohm. That's G-E accuracy.

If you've been postponing a co-ordination program because of the cost or work involved, reconsider the job on the basis of using these new G-E fuse links and new G-E simplified methods. Our local representative can supply you with complete information, including short-circuit nomogram sheets, characteristic curves, co-ordination charts, and a copy of Bulletin GED-1994D. General Electric Co., Schenectady, N. Y.

*These 51-, 52-, 101-, and 102-amp fuse links have time-current characteristics similar to "N"-rated fuse links, 75-, 100-, 150-, and 200-amp, respectively.

GENERAL ELECTRIC

406-2

Here in the WEST

People

W. T. Stewart
has been manager of the Ketchikan Public Utilities since their purchase by the city in 1935. After graduating from the University of

Kansas in electrical engineering, where he was a classmate of Harold V. Bozell, former associate editor of *Electrical World*, he worked with Bell Telephone in the Middle West for five years.

Stuart then migrated to California where he stayed for a short time before moving on up to Alaska at Valdez. There he managed the utility for 14 years before signing a contract with Ketchikan.

He has done a splendid job at his present post, is a great believer in advertising.

C. G. Smith
who writes this month on

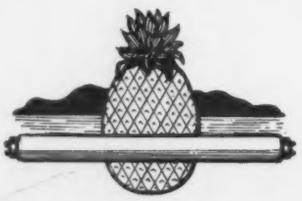
harmonics in relation to capacitors, works with PG and E. in San Francisco, lives in Palo Alto. In 1932 he was working for Southern Sierra Power. He returned to Stanford, and upon receiving his EE degree in '36, joined PG and E's Coast Valleys Division. A year later he was transferred to his present position in the electrical distribution engineering department. Smith belongs to Sigma Xi and the AIEE.

His article on p. 46 is the presentation he made this year before the operating Economics Section of the PCEA.

Preview

Island Installation

Down on the tropic isle of Hawaii in the Honolulu cannery of the Hawaiian Pineapple Co., Ltd., there are 576



Benjamin two-lamp "Stream-Liter" units of 100 watts each over the trimming and packing tables.

This largest industrial installation of fluorescent lighting in the world will be covered in an article in the November issue.

Fluorescent Dance

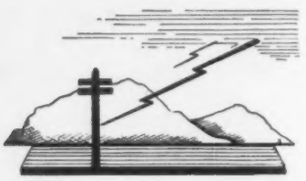
Ancient Indian dances and rituals typical of the Zuni and Hopi tribes are actually being performed now with modern fluorescent effects.

These Smoki ceremonials are world-wide in fame. With colored floodlighting adding to their weirdness, the dances promise to be even more thrilling and awe-inspiring.

Watch for our exclusive story next month on these "new" rituals.

Lighting

A year ago Walter Smith, of G-E, San Francisco, discussed in ELECTRICAL WEST and before the PCEA, means



of lightning protection. He surveyed practices, made recommendations. His article was titled "Lightning on the System" and appeared in the December issue.

This year, in collaboration with A. F. Ayres, of Nev-Cal Electric, he amplified this subject, presented new data. The paper appears next month.

Predicting Load

Puget Sound P & L forecasts its load by a method which yields exceedingly accurate monthly load figures for a year ahead. The method has been perfected in the company's engineering department over a period of years, and will be set forth in the engineering section next month by P. D. Jennings, a Puget Sound engineer.

Pages

Homes in Alaska Use 5,230 Kw.-hr. per Year 29
By W. T. STEWART—In not so remote Alaska, a utility at Ketchikan has built a real load.

"Ranges Recover Revenues" 31
Washington Water Power produces amazing sales results on ranges in "summer slump" months.

Capacitors and Harmonics 40
By C. G. SMITH—Studies show overloaded transformers give rise to undesirable harmonics.

PS of Colorado Designs a Substation 44
By L. M. ROBERTSON—Another case in which design produces economy while providing for growth and flexibility.

ABC's of Relays 47
By E. B. KIPP—Part 4 discusses in simple terms the development of, and reasons for developing, the impedance relay.

"Double Feature" for School Plays 50
A presentation of the new lighting installation in the Santa Rose (Calif.) Junior College auditorium and stage.

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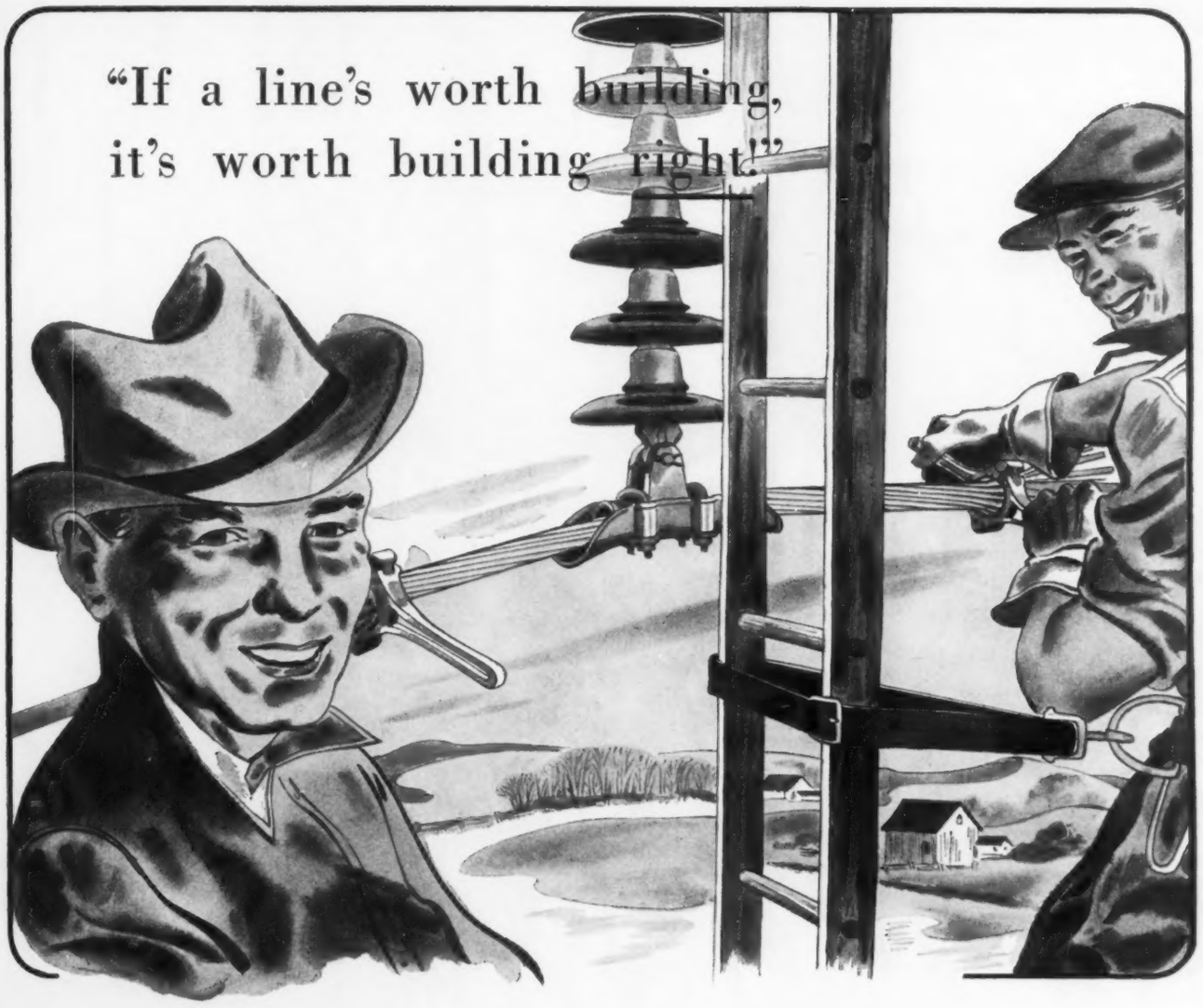
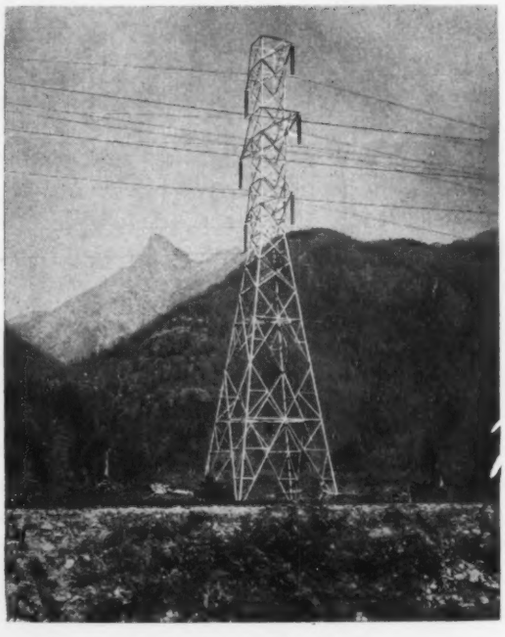
Cover: Photo by F. M. Howard, meter supt. Mountain States Power Co. of Casper Electrical Contractors' Assn. Christmas display last year.





The armor rods being installed here, for example, are classed as "right" by the men who know. Power line conductors, *no matter what they're made of*, have a tendency to vibrate under certain conditions. Armor rods offer protection against fatigue, flash-overs, and wear at points of support.

Armor rods are but one of the devices recommended by Alcoa engineers for increasing a line's dependability. A.C.S.R. engineering standards include complete wire stringing data and a perfected system of vibration control. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

A·C·S·R

Aluminum Cable Steel Reinforced

FOR RURAL LINES AND POWER TRANSMISSION

Inside Facts on the New Allis-Chalmers Distribution Transformer!

NEW ENGINEERING FEATURES GIVE NEW HIGHS IN PERFORMANCE!

If you're looking for *plus* performance in your distribution transformers — easy installation, freedom from service interruptions, greater dependability—*at no extra cost* — take a look at the new Allis-Chalmers Distribution Transformer.

The big 3-Way Terminals spell ease of installation. You save man hours . . . eliminate costly wiring jobs. And the heavy cadmium coating minimizes electrolytic action on either copper or aluminum conductors.

As for dependability — the husky steel tank of every Allis-Chalmers Distribution Transformer . . . with its triple coat automobile finish . . . is tested under pressure to eliminate oil leakage . . . assure you longer life.

Equally important . . . all windings are double insulated for double safety against winding failures. And the improved core and coil design is based on the perfection that has piled up impressive service records during the 40 years Allis-Chalmers Distribution Transformers have been on the lines of systems all over the world.

But that's only part of the story! You get the new Allis-Chalmers Distribution Transformer . . . with all its engineering features that give you new highs in performance . . . at a cost that's no more than you pay for ordinary distribution transformers.

You'll get all the money-saving facts on the new Allis-Chalmers Distribution Transformer from Bulletin B-6096. But the cost-cutting job these transformers can do for you is best told by themselves . . . when you install them on your lines!

A-1269

AC

ALLIS-CHALMERS DISTRIBUTION

1 Revolutionary Cadmium-plated 3-Way Terminal Cuts Installation Time . . . Simplifies Wiring Job . . . Minimizes Electrolytic Action on Copper or Aluminum Conductors.

2 New, Durable Steel Tank, Tested Under Pressure . . . Prevents Oil Leakage . . . Assures Long Life.

3 New Spra-bonderizing . . . Plus Triple Coat Automobile Finish . . . Gives Positive 4-Way Rust Protection.

4 Extra-heavy Porcelain Coordinated Bushings with Liberal Creepage . . . Offer Maximum Reliability Under Fog, Dust, Chemical, or Other Adverse Operating Conditions.

5 Double Conductor Insulation Provides Double Safety Against Winding Failures.

6 Time-proven Core and Coil Construction . . . Designed for Years of Efficient, Service-free Operation.

SEE HOW THE NEW 3-WAY TERMINAL WORKS! First and second pictures show how simply and easily leads can be brought to the transformer from both top and bottom. But you don't stop there! For the third picture illustrates an ***extra*** advantage you get with no other terminal! If necessary, leads can be brought straight out from the transformer, without making an extra bend in the conductors or complicating the wiring job. Notice how the tightening tool travels in an ***up and down*** direction eliminating the chance for accidental shorts across the secondary terminals. Notice, too, that a standard lineman's wrench is used. No special tools are needed. You don't have to buy extra fittings. Heavy cadmium plating of the 3-Way Terminal makes it possible to be used with ***both*** copper and aluminum conductors with a minimum of electrolytic action.

TRANSFORMERS *Cut Operating Costs*

$2.45 approximate cost INSTALLED complete with rod

The time element plays an important part in the cost of anchor installations. Compare the installation time of the Dual Never-Creep with the time required to install a treated log, concrete or scrap iron dead man, add the cost of anchors and rods compare the efficiency of all types and the answer is simply this: Dual Never-Creep Anchors are sound investments that save you time and money.

The calculation above for installing the No. 1110 Dual Never-Creep is based on actual conditions checked by time studies figuring a wage scale of $4.40 per day for labor. These studies reveal that on an average, a Dual Never-Creep Anchor can be installed by one man in less than 30 minutes using an 8-in. auger. Hole boring machines will reduce this installation time to less than half.

Where it is impossible to bore holes, the Dual Never-Creep may be installed as a dead man using either a threaded or Never-Creep rod and give you extra protection against deterioration.

When installed, the Dual Never-Creep Anchor pulls 100% against solid earth. There is no danger of slipping or creeping. Time tests taken over a period of years prove the superior holding power and long life of Never-Creep Anchors.

It pays to use this quicker, easier to install, more efficient type of anchoring.

No. Cat.	Size	Area	Weight	Price less rods
1110	7"x16¼"	110 sq. in.	14½ lbs.	$1 29
1125	7¾"x16 13/16"	125 sq. in.	19¼ lbs.	1.47
1140	8"x18 5/16"	140 sq. in.	24 lbs.	1.70
1176	10"x17⅝"	176 sq. in.	27½ lbs.	2.10
1322	13"x23⅝"	322 sq. in.	60 lbs.	4.98

Distributed by G. E. Supply Corp.

A·B·CHANCE CO. CENTRALIA MISSOURI

NEW PRODUCTS

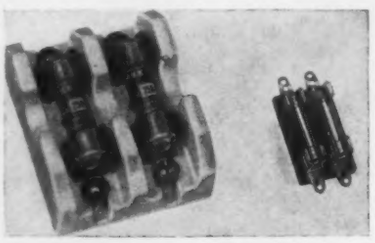
Lamp-Radio (1101)

The new Lumitone table lamp-radio, just introduced by the Mitchell Mfg. Co., provides the added convenience of having a lamp and radio combined within easy reach—plus styling that will enhance the appearance of any room. The Lumitone is of cream color bakelite with a gold base in which the radio dial is mounted. The shade is of celanese taffeta—has a self-fold trim with gold piping. The radio has 5 tubes and a full-sized electro-

dynamic speaker, adequately baffled for volume handling capacity. Complete band coverage. Universal operation. Works with equal efficiency on either a.c. or d.c. 110-120 volts, 40 to 60 cycles. Built-in Air Magnet eliminates the need for unsightly aerial or ground wire attachments. 3-way switch provides selective light. Uses 50, 100 or 150-watt bulbs.

3-AG Fuses (1102)

Littelfuse Inc. are now manufacturing Underwriters approved 3-AG glass-enclosed fuses in ratings up to 8 amp. for 250 volt a.c. or d.c. service or less. This is the first time any manufacturer has the Underwriters' Laboratories approval on 3-AG fuses (1¼ in. by ¼ in. diameter) in current ratings over 3 amp. The illustration shows space savings possible by using the new 3-AG approved fuse instead of the standard cartridge type. At the left are shown two 250-volt cartridge fuses in bulky and heavy porcelain mounting that measures 2¾ in. by 3⅜ in. by 1⅜ in. (12.76



cu. in.). At right, and for the same service, are two 250 volt Littelfuse 3-AG Underwriters' approved fuses and mounting with overall dimensions (including terminals on mounting) of 1 in. by 2 in. by 2⅝ in (1.25 cu. in.). Remarkable space savings are possible as is represented by this example where the actual saving in space is 11½ cu. in.

STRENGTH, ruggedness and durability are combined with definite economy in *Crapo* Galvanized Steel Strand. Low first cost, low maintenance expense are matters of record wherever this time-tested product is in use. Available in all standard grades and sizes from representative jobbers throughout the country. Or, write—

INDIANA STEEL & WIRE CO.
MUNCIE, : : INDIANA

YOU CAN'T AFFORD TO STOP FIGHTING COSTS!

Your costs grow like weeds . . . you can't stop fighting them or they will choke the profit right out of every job. Take a tip—use modern profit-saving **Ideal** tools and equipment. For instance:

IDEAL
JOIST BORING MACHINE

For floor or overhead work. Ends tiresome and dangerous reaching and stooping. Fast, accurate. Merely adjust for distance, tighten set screw . . . strike bit into joist and pull on chain. Reaches up to 11 feet.

IDEAL
Wire Nuts

Just strip wires—screw on—that's all! No solder, no tape. You've never seen a neater joint! Better electrically, stronger mechanically—positive contact insures increased conductivity. Joint will withstand up to 3½ times the pull of soldered joints. Save money on materials—handle more jobs. **Fully approved. Million in use.**

Free Samples on Request

IDEAL COMMUTATOR DRESSER COMPANY
1042 Park Avenue Sycamore, Illinois

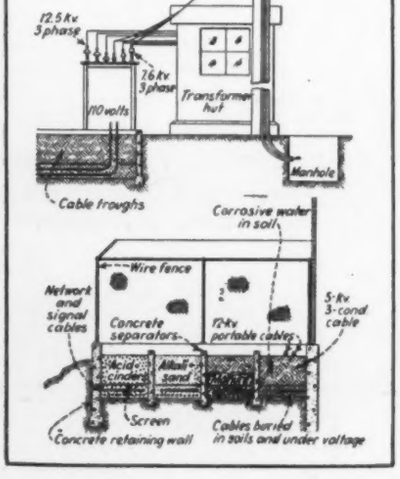
PROVING GROUND PROVIDES CHECK ON CABLE PERFORMANCE

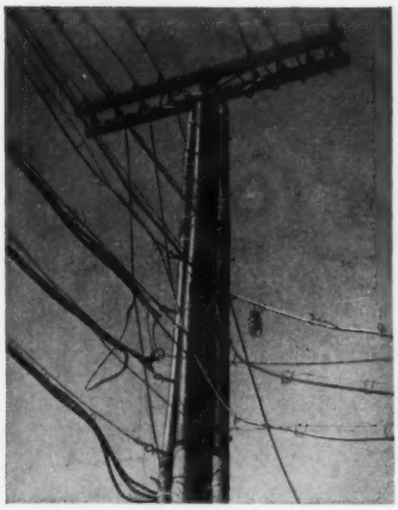
Improved Cable Designs Result from Study of Operating Behavior

Concentrated in the Okonite proving ground are all the destructive elements that attack insulation. Overhead cables are exposed to weather conditions or buried in "graves" filled with soil, impregnated with chemicals, sewage and other corrosive agents.

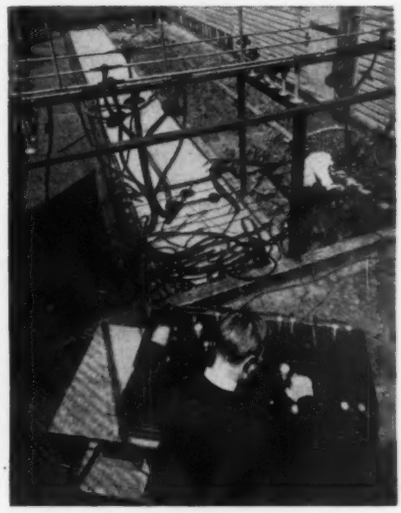
Here, under full load and voltage—duplicating the severest service conditions in every way — cables stay for years.

Arrangement of troughs and high-voltage bus structure in Okonite's proving ground.





Okoprene-protected riser cables, Okolite high-voltage rubber-insulated cables installed on messenger, Okolast tree wire, as well as various other types of overhead cables under comparative test in Okonite's Proving Ground.



Complete electrical measurements are made periodically under the supervision of an independent testing laboratory. Delicate instruments determine the smallest change brought about by aging and exposure to destructive elements.

Performance is checked, both against established standards and against the operating curves of cables of known characteristics determined through years of experience with millions of feet installed the country over.

Here, new products receive their final test before being released for service installations in operating circuits.

Here, new facts are discovered about the behavior of insulation and protective coverings in the presence of destructive elements.

These facts provide the data which our engineers use in the design of still newer and better cables... cables which will, in their turn, stand up longer against harder service in the test of time.

THE OKONITE COMPANY

Founded 1878

EXECUTIVE OFFICE: PASSAIC, NEW JERSEY

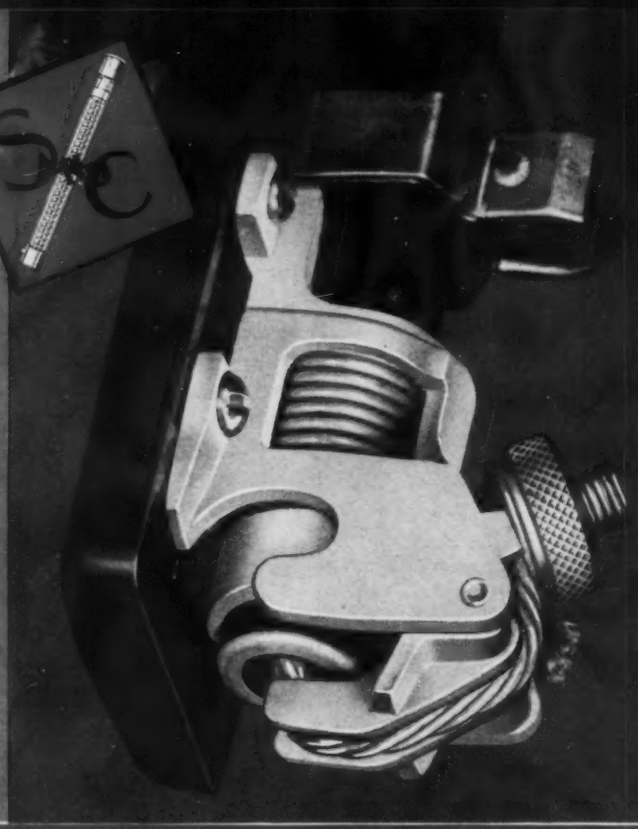
HAZARD INSULATED WIRE WORKS DIVISION

THE OKONITE-CALLENDER CABLE CO., INC.

SALES OFFICES IN PRINCIPAL CITIES

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

THE S&C "FLIPPER" GIVES YOU



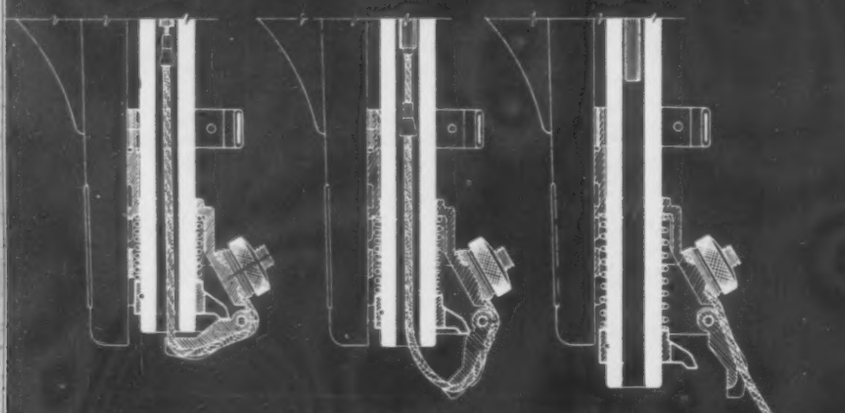
- **Quicker Action**
- **Shorter Arcing Time**
- **Longer Cutout Life**

S & C's cable "flipper" at the bottom of the fuse tube of the SEB Semafor Cutout, insures *positive* separation of the link terminals.

How the "flipper" does this is illustrated in the adjacent diagrams.

By using the S & C Box Cutout you get fast, reliable interruption of fault currents from dead short circuits down to high impedance faults just sufficient to melt the fuse link . . . Shorter arcing time results in reduced system disturbance and longer life for your cutouts.

Other important advantages of S & C Cutouts are described in detail in Bulletin 215-A. Let us mail you a copy.



Position of fuse tube, spring, link cable, and "flipper" during normal circuit conditions. Lick holds tube against compressed spring through leverage of "flipper." Tension on link is positive and continuous, but limited to safe value.

When link blows, restraint on fuse tube spring is released. Tube is forced downward, thus snapping "flipper" downward with multiplied speed due to leverage. First movement of "flipper" pulls cable in a direction straight out of tube.

Even a heavy, stiff 100-ampere link cable is completely removed from tube on low fault currents by the power and speed of the "flipper" action in combination with generated gas pressure.

S & C Type SEB Semafor Enclosed Cutout, 50 and 100 Amp., for 5000 and 7500/12500Y Volt Systems.

SCHWEITZER & CONRAD, INC.
4435 Ravenswood Ave. Chicago, Ill.
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ont.

SEMAFOR ENCLOSED CUTOUTS

Quick Profits

● Dealers who feature these Arvin Circulating Heaters will make quick profits this Fall and Winter. Sales increased 65% last year. With more than twice as much consumer advertising, these Arvin Heaters will sell faster this year. So don't miss the early sales—order from your Arvin jobber now. Three efficient models, beautifully designed and finished. Attractive low prices.

STANDARD MODEL 101
Two-tone green enamel finish. Chrome grille. Convenient carrying handle recessed in back of case. Size—10" high, 9¾" by 6⅛" at base. Weight 7¾ lbs. . . . **$7.50 LIST**

DELUXE MODEL 201
Tan and brown morocco finish. Chromium grille. Toe switch and glow light are exclusive deluxe features. Size—11¾" high, 10⅞" by 6⅝" at base. Weight 9¾ lbs. . . . . **$9.50 LIST**

DELUXE MODEL 201A
(Illustrated on counter card)
Same as model 201 except for finish. Ivory and maroon. **$10.50 LIST**

● All models operate on AC only, 50 to 60 cycles, 110 to 125 volts. Heating element, nichrome helical coil with molded porcelain supports. Motor, induction type — does not interfere with radio. Fan, 2-blade propellor type. Housing heavy gauge steel with rubber feet.

NOBLITT-SPARKS INDUSTRIES, INC. • COLUMBUS, INDIANA

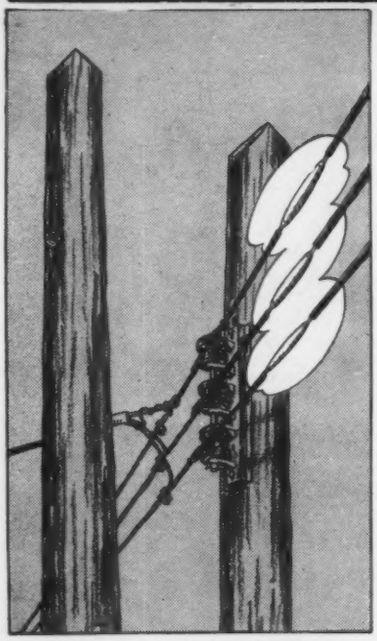
THIS COUNTER WINDOW CARD AND 18 MILLION ARVIN AD SALESMEN HELP YOU SELL

Appearing in October, November and December issues of the magazines shown above, more than 18 million Arvin "Ad Salesmen" will contact your many prospects—paving the way for you to sell Arvin Circulating Heaters, easily and quickly.

Attractive counter-window card, reproduced in miniature at right, is another sales help, FREE to dealers. It is lithographed in three colors (red, yellow and black) and helps you to cash in on the consumer campaign. Size of card, 16" wide and 20" high. Ask your jobber for it—also a supply of FREE folders to mail with your monthly statements.

ARVIN
ELECTRIC FAN-FORCED
Circulating Heater
Just what you need
FOR: Bathrooms . Nurseries . Dens
Guest-rooms . Game-rooms . Sun-rooms
Trailers and Camp Cottages
Invalids' Rooms in Homes or Hospitals
Small Offices and Ticket Booths
Hair and Clothes Drying . Bath Houses
Photographers' Drying Rooms
For Baby's Bath and other uses where extra or temporary heat is needed.
Warms Air Completely—drawing in cold air from floor, heating it and forcing it into room.
Circulates Heat—employing efficient fan-distributing principle used in modern home heating systems.
Gives Immediate Heat—for bathing, shaving and dressing, when furnace fire is low or room is chilly.
Portable—easily carried from one room to another to drive chill away. Plugs into any 110-A.C. wall outlet.
Safe with Children—because heating element and fan are enclosed. Won't burn you, if upset accidentally.
Efficient and Economical—with air-brake louvers and waist-tanning fan behind heating element, to drive heat off where and not into room.
Approved by Underwriters' Laboratories and Good Housekeeping Institute
GUARANTEED AS ADVERTISED IN GOOD HOUSEKEEPING
PLUGS IN ANY 110-A.C. WALL OUTLET
DeLuxe MODEL 201A

modernize
YOUR
DISTRIBUTION
PRACTICE—



Illustrating simplicity of wiring when a line is moved.

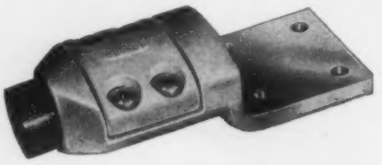
RELIABLE
STRAIGHTLINE
SPLICE

Carefully designed and engineered, precisely manufactured—these splices have a record of years of dependable performance. They are now used by most operating companies to make high strength, low cost joints and in emergencies to quickly get the load back on the line.

Reliable
ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

Cable Terminal (1103)

The "Streamlined" cable terminal, Type SNA-H, developed by Burndy Engineering Co., is especially designed to facilitate easy taping of the connector and helps insure a moisture-proof seal to the insulation. A recess at the cable entrance permits the end of the cable insulation to be inserted into the connector and thereby shrouds and protects the cut end of the insulation. The illustration



herewith shows the terminal with the cap clamped on the conductor by means of hollow head cap screws. This type of connector is also made with hexagon head cap screws set in recesses in the cap in such a manner that they can be tightened with an ordinary socket wrench.

Air Circuit Breaker (1104)

A compressed-air circuit breaker, type CA, for indoor service on 15,000-volt circuits has just been introduced by Westinghouse. Designed for interrupting capacities as high as 2,500 000 kva., the new breaker interrupts arcs on the "cross blast" principle; that is, the arc is drawn between contacts which open in a line perpendicular to insulating splitter plates.

The compressed-air stream is blown at right angles to the arc and elongates it between these plates. A muffler placed at the end of the arc chute serves to eliminate residual flame and to reduce noise. It has a large cross section, so that the gas velocity is low and cooling is facilitated. The circuit breakers are equipped with air storage tanks. Pressure in these tanks is 150 lb. per sq. in., and drops about 20 lb. per sq. in. for each close-open operation.

Petroseal (1105)

To meet the need for an oil-resisting electrical caulking material for transformer and oil switch bushings and covers, the Johns-Manville Research Laboratories have developed a new, permanently plastic substance called Petroseal, a compound that is equally adaptable to any electrical apparatus employing transil oil. Petroseal is described as a non-hardening, adhesive plastic compound which will not slump or flow, nor dry out or check. It remains easily workable over a wide range of temperature. It adheres readily to any clean, dust-free surface, yet can be easily removed and salvaged. The material has good dielectric strength and is not injurious to workers' hands.

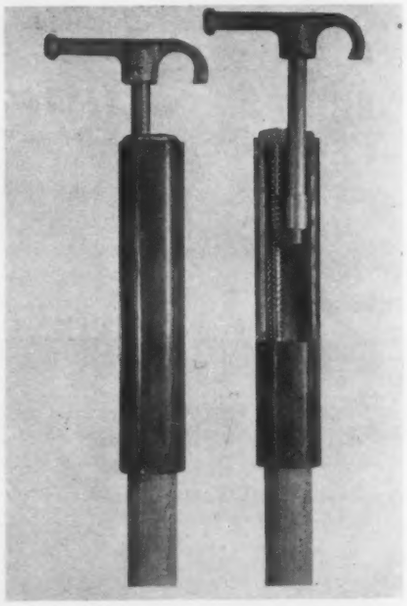
Fixture Switch (1106)

McGill Mfg. Co. has presented a new fixture switch which embodies an exclusive arrangement for attaching wire leads to terminals. It is small, compact, strong, and has an exceptionally smooth, easy "pull." Fits wall

thickness up to 5/16 in., and has 9 in. wire leads, stripped ¾ in. Overall dimensions, ⅝ in. by ⅞ in. Rated: 3 amp., 125 volts—1 amp., 250 volts. Listed as standard by Underwriters' Laboratories.

Disconnect Stick (1107)

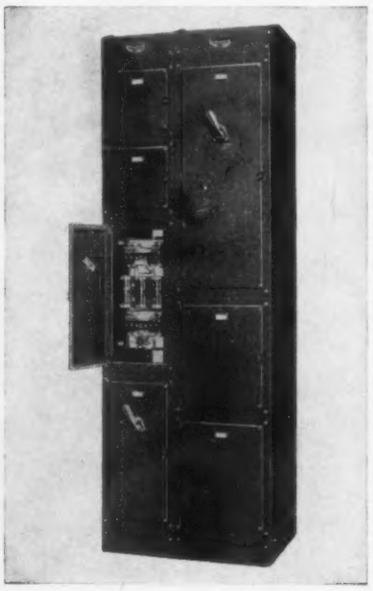
A hammer-type disconnect stick, that is proving very useful for "hammering open" switches whose blades have become stuck or corroded in the contacts, has been designed by James R. Kearney Corp. The disconnect hook travels approximately 1½ in. either from a push or pull on the stick. At the end of this travel the hook strikes the ferrule with a



sharp impact, opening the most stubborn switch blade. At the completion of the "push" or "pull" on the stick, a spring, enclosed in the ferrule, returns the hook to its original position.

Unitrol (1108)

Unitrol represents a new engineering idea in motor control installation. Built on the same principle as today's sectional filing cabinets by Cutler-Hammer, this latest development permits all needed types of control devices to be organized in locker-like motor control centers instead of the usual "pillar and post" method of mounting. The standardized construction allows quick building up of any Unitrol control center to meet present requirements—and without special engineering. Future changes due to expansion, shop layout changes, etc., are quickly and easily taken care of by adding or removing sections, or by replacing the unit controllers. With Unitrol construction standard Motor Control units are mounted in standardized cubicle sections (see illustration). These sections are made in thirty-two sizes; eight widths, four heights (one depth)—for mounting any desired combination of units.

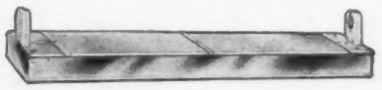


Immersion Heater (1109)

Edwin L. Wiegand Co. announces a new Chromalox immersion heater called the Type MF for water heating and oil heating, embodying improved design and operating efficiency. Capacities from 750 to 5000 watts inclusive. Installed by bolting in place against a flat gasket seat (gasket furnished with heater). If tank or container is sheet metal, a companion flange or bushing holds the heater in place. Features include—patented heating element construction for efficient heat transfer, long life and the ability to withstand electric overload. Large, sturdy rectangular heating surface insures long life and mechanical strength. Copper sheath is standard for water heating, steel sheath furnished for oil heating.

Wiremold Fluorescent (1110)

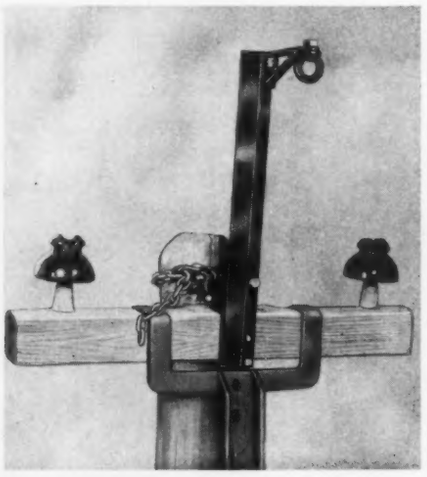
Available in unit lengths for any specified size and number of fluorescent lamps, with or without Alzak reflectors of either concentrating or diffusing types are new Wiremold wired and unwired fluorescent units. Wired units are now supplied as standard with white plastic lamp holders, with channel and covers



aluminum finish. New Wiremold controls, designed to fit within the channel make a completely self-contained installation. Available fittings include hangers for ceiling, wall or special applications.

Transformer Gin (1111)

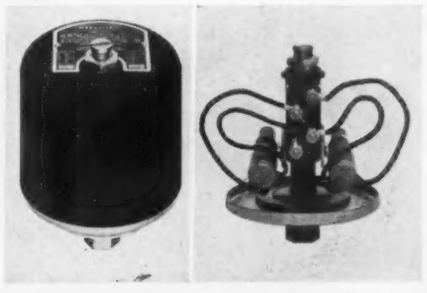
A new transformer gin has just been placed on the market by A. B. Chance Co. It weighs only 14 lb. yet is sufficiently strong to hoist a 37½ kva. transformed. It has been repeatedly tested at 2,000 lb. without signs of weakening and is rated to lift 1,350 lb. This



gin may be mounted either on the pole or over a crossarm by changing the position of fittings with a simple set screw adjustment. A swivel ring at the top of the gin permits the rope block to turn at any angle and thus avoid binding.

Automatic Switch (1112)

An automatic contact pressure responsive switch has been developed by Center & Giveen Co. to open or close an electrical circuit under predetermined low or high pressure conditions. Designed for service on noncorrosive liquids and gases, these switches are fitted with Durakool mercury tubes which



are enclosed in an unbreakable steel shell covered with Bakelite. False stops and starts caused by chattering are eliminated by a quick yet gentle tripping action imparted to the tube. Diaphragm is of pure gum rubber with duck insert for additional strength.

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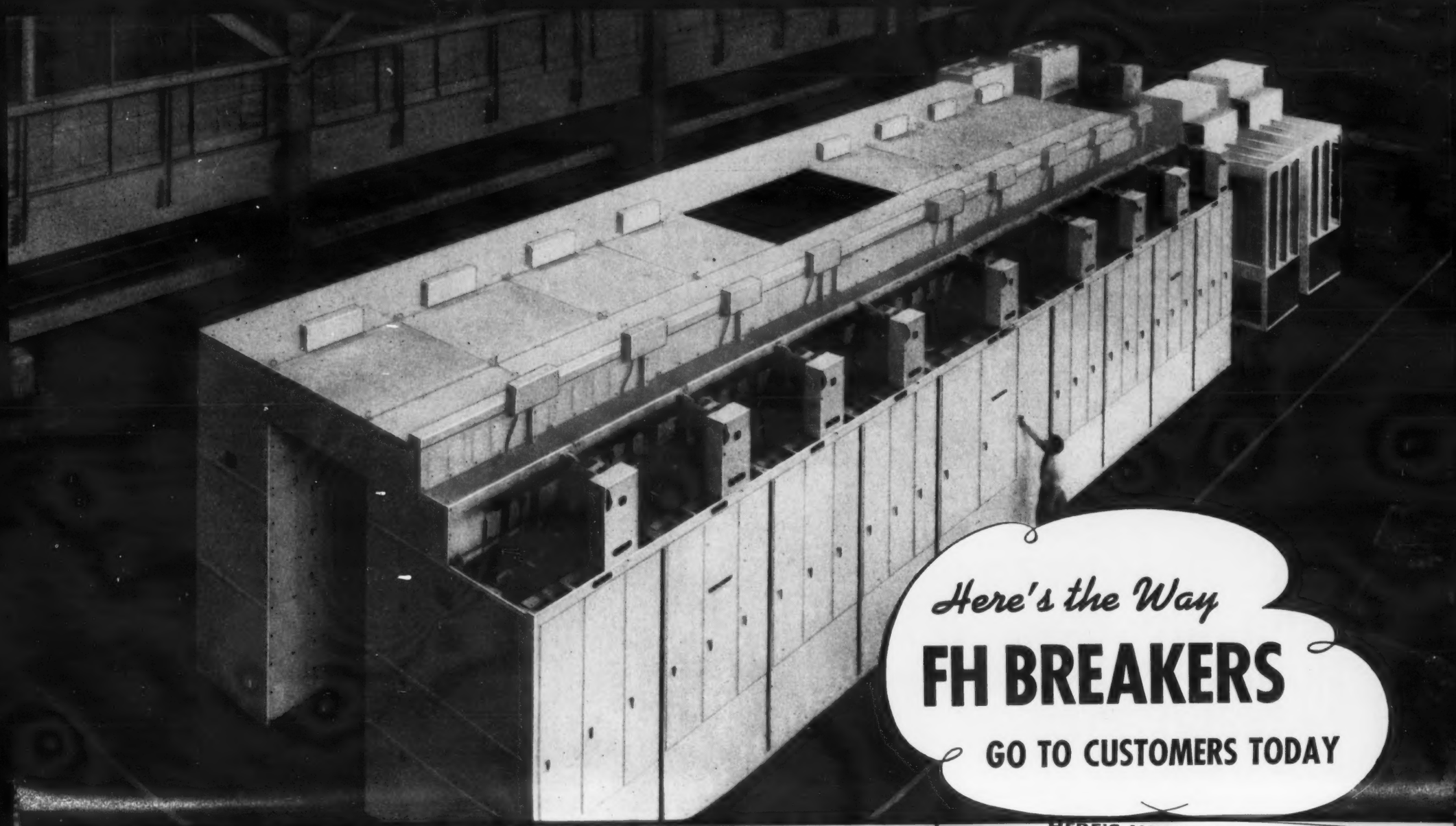

Here's the Way

FH BREAKERS

GO TO CUSTOMERS TODAY

You probably have FH breakers on your system now. And you know how General Electric has been building them into steel cubicles for more than six

HERE'S WHAT YOU GET—

Completely Factory-assembled

YOU probably have FH breakers on your system now. And you know how General Electric has been building them into steel cubicles for more than six years. You also know how this construction saves installation time and cost, saves space, and provides the most reliable protection. As one engineer expresses it, with FH cubicles "the cables in and the cables out are all you have to worry about."

FH cubicles are available with either low-oil-content breakers or air-blast breakers.

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1. Modern low-oil-content or air-blast Type FH breakers, 500,000 to 2,500,000 kva
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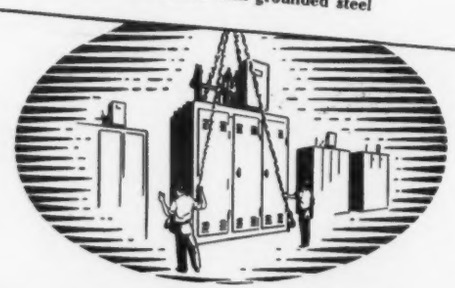
3. Six group-operated, heavy-duty isolating disconnecting switches
4. Mechanical interlocks for breaker, switches, and doors to assure correct sequence of operation
5. Heavy-duty structural-shaped buses
6. Heavy-duty bus supports
7. Copper interconnections with silver-to-silver current-exchange surfaces
8. Necessary current transformers
9. Phases segregated with grounded steel



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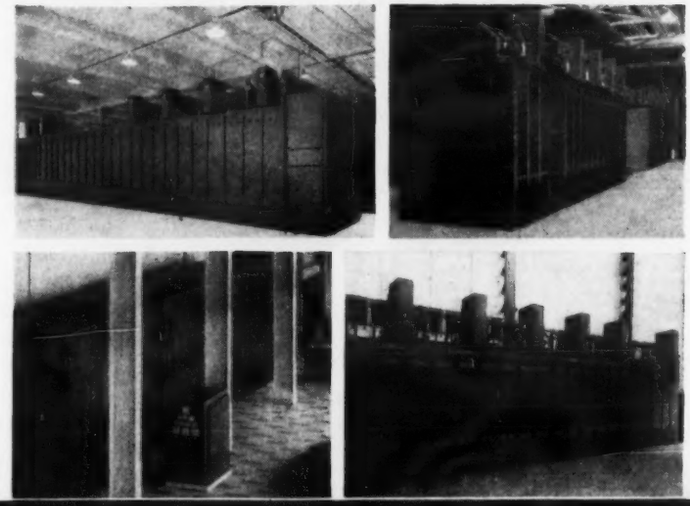
The Old Concrete Problem Solved with Steel



PRINT IN BINDING

GENERAL ELECTRIC

855-6

Sherman Offers A Complete Line of Dependable Quality Soldering Lugs

Round End Standard Side Formed Lugs (Ask for Trade Bulletin No. 6)

Round End Standard Center Formed and Angle Lugs. (Ask for Trade Bulletin 6)

Standard and Heavy Duty 2-Hole Lugs. (Ask for Trade Bulletin No. 21)

Heavy Duty 4-Hole Lugs. (Ask for Trade Bulletin No. 21)

Sherman Soldering Lugs are precision made from seamless copper tubing of high purity. They fully meet standard specifications, and are completely interchangeable with corresponding cast lugs. Smooth and bright, accurately sized, free from burrs, and with flat contact surfaces.

Sherman lugs are available, either in stock or on special order, to meet virtually every requirement. Write for specifications and samples.

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H. B. SHERMAN MFG. Co.

Battle Creek, Mich.

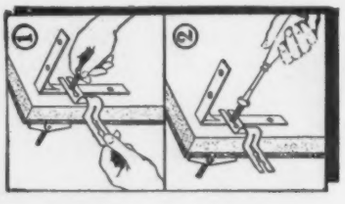
"Quicklag" Circuit Breaker (1113)

New perfection in circuit protection is attained by a new small circuit breaker just presented by Westinghouse. Designed primarily for the protection of lighting, appliance, and motor circuits in homes, buildings, stores, and factories, this new "Quicklag" circuit breaker introduces a new principle to circuit protection. Its name, though paradoxical, is apt, for this breaker successfully combines for the first time in a single unit a cooperative magnetic and a thermal trip—something which no breaker has ever done before. It is available in ratings of 15 to 35 amp., single pole only, 250 volts a-c and 125 volts d-c. The comination of the Bi-metal thermal and the magnetic trip actions gives the new device the advantage of instantaneous

trip on short circuits combined with the well-known advantage of time-delay for momentary overloads such as those caused by lamp, appliance, or motor inrush caurrents. The thermal action is designed to take care of inrush currents for all of the common combinations of household appliances without causing an unnecessary service outage. The magnetic action gives instantaneous circuit opening for all short circuits, even those in the lower current ranges—down to 200 amp.—such as are caused by incomplete flexible cord shorts.

Toggle Bolt Clamp (1114)

A toggle bolt clamp has been developed in the Research Laboratory of The Paine Co., manufacturers of Paine Anchoring Devices and other Builders' Specialties, that promises to revolutionize the installation of all Toggle Bolts up to and including ¼ in. diam. It is



a small, handy gadget that can be carried in the vest pocket. Actual tests prove conclusively that it will cut toggle bolt installation time 50 per cent and at the same time enable the mechanic to use a screw driver instead of turning bolt with the fingers. It is made of a high quality steel—with die-sunk recesses on opposite sides of the slots providing a positive female threading action. You simply follow the ordinary toggle bolt installation procedure and when toggle bolt is ready to be tightened—you pull toggle tight against inside of wall, floor or ceiling—slip clamp over bolt thread flush against bracket or fixture to be anchored, and screw bolt tight with screw driver, as shown, then remove clamp and give bolt one more turn.

Time Delay Relays (1115)

A new series of 128 models of Interval Timers and Time Delay Relays has been developed by the Paragon Electric Co. They are powered by slow-speed, self-starting synchronous motors, and equipped with fast-acting silver contact micro-switches. These all-electric controls are designed for the many types of electrical equipment which must be

accurately timed in split seconds, seconds, minutes or hours. These are manual or automatic reset models for built-in flush panel mounting, enclosed surface mounting or wall mounting.

Sunbeam Attachment (1116)

Chicago Flexible Shaft Co. now manufactures an attachment for their Sunbeam Mixmaster. It is a butter churn which attaches right onto the beater spindles with no auxiliary power transfer unit required. With this butter churn, 2 qts. of cream produce about 1¾ lb. of butter. Mixmaster does the arm-

work in 11 min. as compared with at least 15 min. of churning the old hand way. Built of stainless steel, rustproof inside parts, wood paddles, sturdy 4-qt. crystal-glass churning jar. Has self-contained power transfer unit.

★ Our glazing department is exceptionally well equipped to glaze porcelains of any size manufactured. We employ the most modern equipment and methods.

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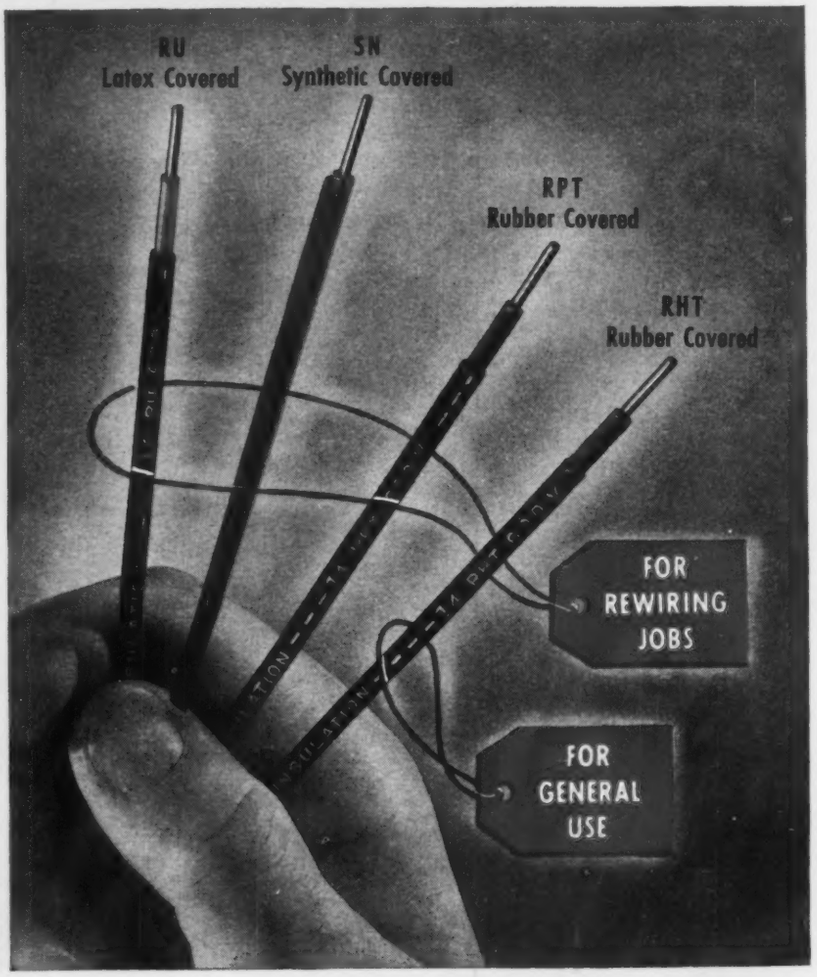

Then get the Roebling Catalog for Permissible *Percent of Conduit Fill—Current Loadings—Operating Temperatures*—and other information you need to estimate new work and rewiring jobs.

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With the exception of SN, these wires are required with a fibrous covering that is moisture-resistant and flame-retardant.

Detailed characteristics of requirements of these types of wires are available in separate standards of the Underwriters' Laboratories, Inc., New York, N. Y. These may be obtained direct or by requesting us for copies.

Roebling *Rubber Covered Wires and Cables—Service Entrance Cable* Catalog will be helpful in the proper selection of wires for your job. It should be on the desk of every man concerned with wiring work. If you haven't a copy be sure to write for it today.

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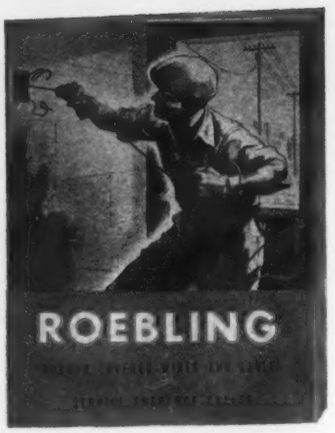

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ROEBLING SMALL DIAMETER BUILDING WIRE

IN PITTSFIELD WORKS ASSEMBLY LINE

WE SCRUTINIZE THE "LITTLE THINGS"

ONE reason why you get a full measure of value with G-E distribution transformers is our constant aim toward perfection of detail in both design and manufacture. Look into any operation in the building of a G-E transformer and you will find ample proof that this policy is definitely in force.

For example—the brazing of the terminals to the low-voltage leads during final assembly of the transformer interior. Because we use a silver-alloy insert in making the joint, we get a low-loss connection. Because the brazing process is *automatically* controlled, the quality of the brazing is uniformly high. Because *high-frequency* brazing is employed, we get permanence—a tough annealed joint instead of a brittle one.

This constant attention to detail, verified by frequent inspections throughout manufacture, is a vital part in our program of providing better transformers at the lowest possible cost to the purchaser.

GENERAL ELECTRIC

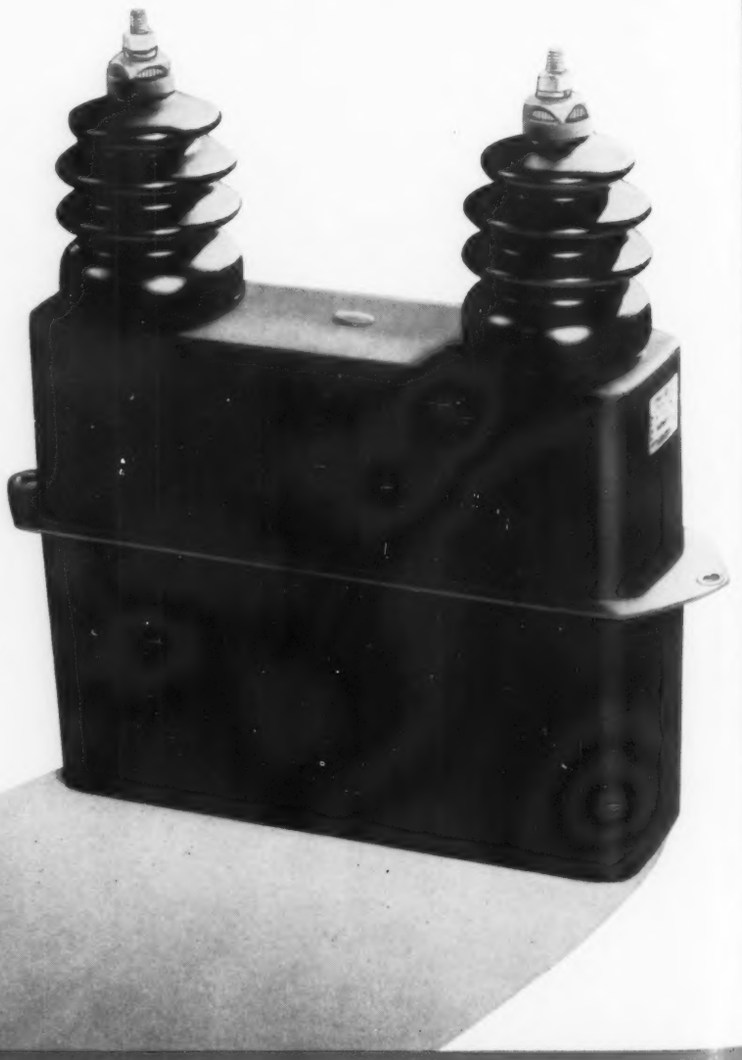
402-21

Fast, Easy Way to "EXPAND" Your System

MORE system capacity—in a hurry—and with adequate provision for future changes in power demands. That's what Pyranol capacitors provide on systems where power-factor is low and feeders and transformers are overloaded. By neutralizing reactive kva, they release valuable system capacity to meet the new and increased demands for more power.

Pyranol capacitors are easy to install—easy to adapt to your requirements. Banks of any desired rating can be made up from standard 10- and 15-kva units. They can be located anywhere on the system; installing them is simply a matter of hanging them on a pole and making connections. They *stay on the job,* too, because Pyranol capacitors are carefully engineered, and each unit is carefully tested. Their operating record is exceptionally good. Looking into the future, Pyranol capacitors installed now can easily be moved to new, more effective locations if load conditions change.

If your immediate problem is to increase feeder or substation capacity, investigate the possibilities offered by Pyranol capacitors. Popular ratings are carried in stock for fast delivery. We ship direct from the warehouse shelf. Ask our local representative for complete information—or write for Bulletin GEA-3333, "Pyranol Capacitors for Distribution Systems." General Electric Co., Schenectady, N. Y.

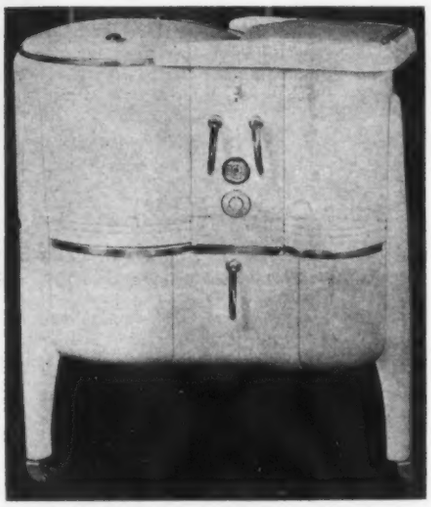


GENERAL ELECTRIC

407-13

New Hotpoint Washer (1117)

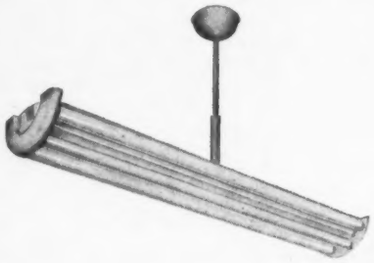
Two new spinner-type washers, one equipped with temperature and time indicators, have been announced by H. E. Warren, manager, Hotpoint home laundry division. Both these washers have advanced, deluxe features and styling, combined with the Thriftivator. Both washer and spinner tubs of the deluxe Pru-



dence washer are finished in white porcelain-enamel. Tub covers, base and legs are granodized for rust-resistance, and finished in white enamel. Chrome bands trim both base and top of the Prudence tubs. Thriftivator and spinner-basket controls, and lifting knobs on the tub cover are also chrome-finished. Entirely new features on the Hotpoint Prudence model are the convenient temperature indicator and timer dial. Both are handily located on the control panel. The temperature dial indicates correct water temperature for proper washing of various fabrics, making it possible for the operator to adjust precisely the hot and cold water supply to suitable temperatures.

Wakefield Unit (1118)

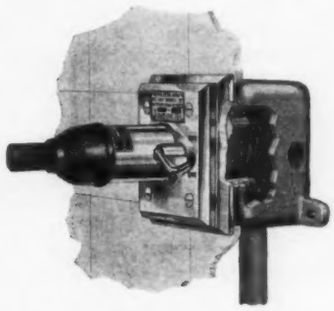
Developed by The Wakefield Brass Co. is a four-light, exposed-lamp-type lighting unit called The Captain. It is ideally suited for store lighting, providing an even illumination over a wide area by its circular formation. This unit accommodates four 40-watt fluores-



cent lamps and uses the new two-lamp ballasts with separately mounted starters. Due to out-of-phase relationship of the lamps, stroboscopic effect is minimized.

Hospital Receptacles (1119)

A series of explosion-proof sealed hospital receptacles has been designed by The Appleton Electric Co. for use in hospital operating rooms. They are made in accordance with requirements for hazardous locations. All wire leads are sealed and connections made in

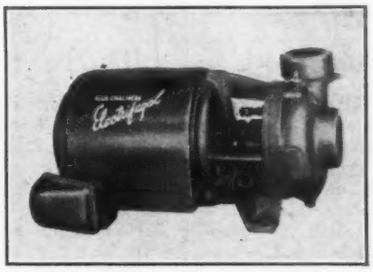


Unilet body furnished. Receptacle member is a sealed unit with an inter-locking switch whereby the plug may be inserted or withdrawn only when the switch is in "off" position.

"Electrifugal" Pump (1120)

An "Electrifugal" pump, which is an all-in-one centrifugal pump especially designed as a complete pump and motor unit on one shaft and one housing, has been developed by Allis-Chalmers Mfg. Co. Instead of using standard motors having special end housings and shaft extensions, the "Electrifugal" pump-

ing unit has a special motor with a one piece iron motor yoke and pump bracket. The feet



are cast integral with the housing and bracket and extend under the entire unit instead of under the motor only. In splash proof construction the "Electrifugal" pump is now available in sizes from 1 hp. to 10 hp. inclusive at 3500 rpm. and from ¾ hp. to 7½ hp. inclusive at 1750 rpm. for heads up to 160 ft. Larger sizes of this type are in the process of design.

Kearney Disconnect (1121)

A switch to meet the need for greater flexibility in sectionalizing and interconnecting distribution feeders is the new 400 amp. Kearney Dead Blade Porcelain Housed Disconnect, which incorporates the use of multi-point pressure contacts for cool operation and an expanding latch to facilitate easy opening and closing. This switch is similar to the 600 amp. switch with multi-point pressure contacts and was designed to meet proper mechanical and dialactic strength.

MODERNIZE with

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The Up-to-the-Minute Method

for SPLICING and DEAD-ENDING

Nicopress Splices and Dead-Ends are quickly and easily made.

Neat in appearance and not much larger in diameter than the wire, Nicopress splices are as strong or stronger than the rated breaking strength of the conductors, and so tight the wires cannot pull out.

Nicopress Sleeves and Tools are being used by a large number of power and light companies throughout the world with eminent satisfaction.

Order from your jobber today and start splicing and dead-ending the Nicopress way.

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PRODUCT DATA

Protective Lighting (1122)

"Planned Protection" against sabotage is the subject of a new Graybar bulletin just issued. Effective floodlight planning, good lines of communications and power failure in plants are discussed. Graybar aids for protection and valuable suggestions for safety systems are presented. A plant protection check list is also included.

Nozzle-Swirl (1123)

The Nozzle-Swirl process of applying lead sheath on General Electric paper cable is explained in a new four-page bulletin just published. What the process accomplishes is outlined and a simplified sectional diagram of the cylinder of a lead-extrusion press is shown in color. Then the filling operation is given on the following page. On the next page is proof that this process produces oxide-free lead sheath.

Control Relays (1124)

A 4-page illustrated booklet giving descriptive, construction ,and electrical and mechanical data on the type SG auxiliary control relays has just been issued by the Westinghouse Electric & Mfg. Co. These relays, available for both a.c. and d.c. operation, have a wide application in all types and kinds of control circuits, from motor control to complicated relaying systems. Features are described and tables give complete rating information, including coil characteristics, contact styles, etc., on both a.c. and d.c. types. Time delay is discussed and volt ampere burden is given for various operating conditions.

Correct Lighting (1125)

"Bright Evenings at Home—with Light Conditioning," is the title of a new Northern California Electrical Bureau booklet which is a real handbook on correct modern lighting. Such items are covered as How to Light Condition the Rented Home, Shining Hours in a New Home, The Right Size for Your Eyes, etc. It is an invaluable publication, filled with hundreds of ideas from which both home owners and electrical contractors alike will benefit.

Maintenance Hints (1126)

Maintenance Hints, a loose-leaf binder containing booklets of hints on electrical maintenance is prepared by the service department of Westinghouse Electric & Mfg. Co. Additional booklets covering other topics are issued from time to time to be added to the binder. Issued so far have been sections on inspection, direct current motors, insulation materials—their applications, cleaning and drying and testing, A-C induction motor, convenient tables and formulae, commutator maintenance, bearings and lubrication, starting and speed regulating rheostats for direct current motors, starters for A-C squirrel cage induction motors and contactors. The binder is leather and of pocket size for ready reference by the maintenance electrician or industrial contractor.

Air-Circuit Breakers (1127)

A 12-page illustrated catalog which lists and describes "De-Ion" air circuit breakers for load center, panelboard, switchboard, or enclosure mounting has been published by Westinghouse. These type "AB" breakers are available in ratings from 15 to 600 amp., one, two, or three pole for operation on a.c. voltages of from 125 to 600, and d.c. voltages of 125 and 250 volts. The catalog contains a complete listing of AB breakers for all mounting requirements; prices are included. Dimension sketches, with all important dimensions relating to mounting and space clearances, are given for the breakers listed.

Novalux Control (1128)

Novalux control equipment for street-lighting circuits is the subject of a new 12-page G-E bulletin. Construction features, uses and advantages, types and ratings, selection and application and wiring diagrams form the bulk of this publication. Illustrations assist in telling the complete story.

Switching Equipment (1129)

A 24-page illustrated booklet describing type FP capacitor rack and switching equipment for both indoor and outdoor service as a method ofr raising power factor or increasing feeder capacities has just been issued by Westinghouse Electric & Mfg. Co. Complete in every detail, the booklet contains informative selection and application data on capacitors. Construction and operating features of the FP equipments are outlined and explained in simple easy-to-read language. Photographs illustrate the points brought out in the text. A complete catalog listing of capacitor units is included with data on ratings, dimensions, and mounting details. Wiring diagrams for every type of capacitor installation are given, and typical switching control diagrams are also included.

Oil-Circuit Breakers (1130)

Allis-Chalmers Mfg. Co., Boston Works, presents Bulletin B-6122 describing the company's type OX-110 oil-circuit breakers for moderate capacity applications on outdoor distribution service. It illustrates and describes this quick clearing (8 cycle) breaker of non-oil-throwing design, framework mounted, rated 600 amp., 15,000 volts and 50,000 kwa. interrupting capacity. It covers details of design such as the high speed solenoid operator, massive cast steel top frame, expulsion port action of arc interruption, etc.

Overcurrent Relays (1131)

A 20-page illustrated folder on types CO, COA, and COH overcurrent relays is announced by Westinghouse. Five pages are used to discuss application data, construction features, and electrical characteristics. Outline dimensions, time curves, prices, and connection diagrams are included in this issue.

Look at the PLUS VALUES in the NEW BRIEGEL METHOD CONNECTOR

Constructed From Fine Sheet Steel **. . . making stronger, neater and more durable connections than ever. Impossible to split the tube end because of inbuilt tensile strength of the sheet steel.**

Larger Shoulder **. . . completely closing the knockout hole in the box.**

New, Improved Bonding-Type Lock Nut.

No Open Seam **. . . Lap seam construction makes all connections smooth and finished.**

NO INCREASE OVER PRESENT LOW PRICES

Patents Pending
Approved by Underwriters Laboratories

Distributed By:

The M. B. Austin Co., Chicago, Ill.
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BRIEGEL METHOD TOOL CO., Galva, Illinois

THE Safety Factors

that Shell's industrial customers are all so enthusiastic about are a very real kind of "insurance" against avoidable mechanical and lubricant failures.

If you're wondering "what are these Safety Factors? ... what specific savings can they offer me? *"... call up your local Shell office. We promise you that every minute you give the Shell representative can pay you back substantial dividends.*

SHELL

Oil-Circuit Breaker (1132)

The FK-142 Oil-Circuit Breaker, manufactured by General Electric, is an eight-page bulletin. This 25,000 kva. breaker is completely described by cross-section photographs, showing hidden details. Manual and solenoid operation are also included. Reduced-voltage starting with an autotransformer is discussed and illustrations and diagrams offered along with dimensions and ratings.

Miralume (1133)

Miralume, the "modern miracle of fluorescent lighting," is the title of a new catalog just issued by the Hygrade Sylvania Corp. In it is a listing of models available in the Miralume line. The complete story of these nationally-advertised complete fluorescent units is given. Installation is thoroughly outlined and specifications offered.

Roller-Smith Breakers (1134)

A new Roller-Smith catalog which illustrates and describes outdoor oil circuit breakers of 7500-volt rating and 50,000 kva. interrupting capacity has just been issued. Construction features are pointed out and various diagrams and tables show dimensions and ratings. These breakers are available in two, three and four pole, and 400 and 600 amp.

Electromode (1135)

A prospectus that tells the complete story from the dealer angle about the Electromode electric unit air heater for domestic use has just been published by the Electric Air Heater Co., division of the American Foundry Equipment Co. The presentation outlines in a business-like way everything a prospective electrical dealer wants to know: (1) the market, (2) the dollar margin, (3) why electric heat is not expensive, (4) sales outlets, (5) advantages of electric heat, (6) advantages and features of Electromode heaters, (7) dealer helps, (8) advertising and sales promotion campaign, (9) dealer franchise.

Electric Heating (1136)

"Electric Heating in the Modern Home" is discussed in a four-page bulletin issued recently by The Air Conditioner Sales Corp., subsidiary of The Noma Electric Corp. A general data sheet shows determination of capacities, efficiency, construction, circulation, and delves into the ultimate cost of electric heating.

Rittenhouse Catalog (1137)

Bell, signalling toy and special transformers and electric door chimes are included in the 1941 edition of the A. E. Rittenhouse Co. catalog. Various door chime models are illustrated, several entirely new in design. One page is devoted to wall and counter display boards available to dealers.

Electrical Contacts (1138)

Gibsiloy electrical contacts are presented in a 14-page publication that is just off the presses. In this Gibson Electric Co. catalog, electrical contact materials are discussed and the mechanical application of contacts illustrated by simple diagrams. Concluding pages show by illustrations Gibsiloy contacts in electrical apparatus.

Eye Protection (1139)

"Protecting Eyes in Industry" is an 18-page bulletin issued by the U. S. Dept. of Labor, which includes addresses presented before the industrial section of the National Society for the Prevention of Blindness at its annual conference.

Quick Selector (1140)

The new 64-page September, 1940 edition of the popular "Quick Selector" catalog has just been issued by Westinghouse. This is the second 1940 edition of this handy catalog that simplifies selection of the correct electrical equipment for any motor, lighting, or feeder circuit. Safety switches, No-Fuze breakers, multibreakers, distribution panelboards, motors, and motor controls are featured in successive sections of the catalog, with time-saving section index right on the front cover.

V-Belt Data Book (1141)

With every page packed with data, The B. F. Goodrich Co. has just published a new 170-page "V-Belt Data Book," which is available upon request. The book gives alphabetical listings of belt requirements for electric refrigerators, washing machines, water pumps, beer pumps, stokers and oil burners, gasoline pumps, wood-working machines, air compressors, power lawn mowers, buffing machines, floor sanding machines, garage and shop equipment, milking machines and slicing machines.

Transformers (1142)

An 8-page illustrated bulletin describing and listing a complete line of transformers for luminous tube service, such as neon signs, has just been published by Westinghouse. Bulletin contains complete, well illustrated description of the transformer's construction, pointing out salient features that insure dependability. Several types employing various mounting arrangements are illustrated. Complete information, in the form o ftables, is given on all styles of the transformers. Ratings, both electrical and mechanical, and dimensions are included. Conversion tables and sign letter footage also is given.

SAVE TIME! USE THIS COUPON

To keep posted, simply circle the items in which you are interested, cut out the coupon (it can be pasted on the back of a postcard) and mail to:

ELECTRICAL WEST, 68 Post St., San Francisco, California
Please send me the following CIRCLED items:

1101	1102	1103	1104	1105	1106	1107	1108	1109
1110	1111	1112	1113	1114	1115	1116	1117	1118
1119	1120	1121	1122	1123	1124	1125	1126	1127
1128	1129	1130	1131	1132	1133	1134	1135	1136
1137	1138	1139	1140	1141	1142			

Name ..... Title* .....

Company* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

NEW BOOKS

ELECTRICAL CIRCUIT AND MACHINE EXPERIMENTS, by Frederick W. Hehre and J. Arthur Balmford, published by John Wylie & Sons, Inc., $2.00. This is a manual to aid in experimental work performed by non-electrical engineering students. It is written to save time of instructors by assembling the essentials of a great variety of the more common experiments, including therewith brief discussions of theory where necessary, and references to principal text books on the particular subject in question.

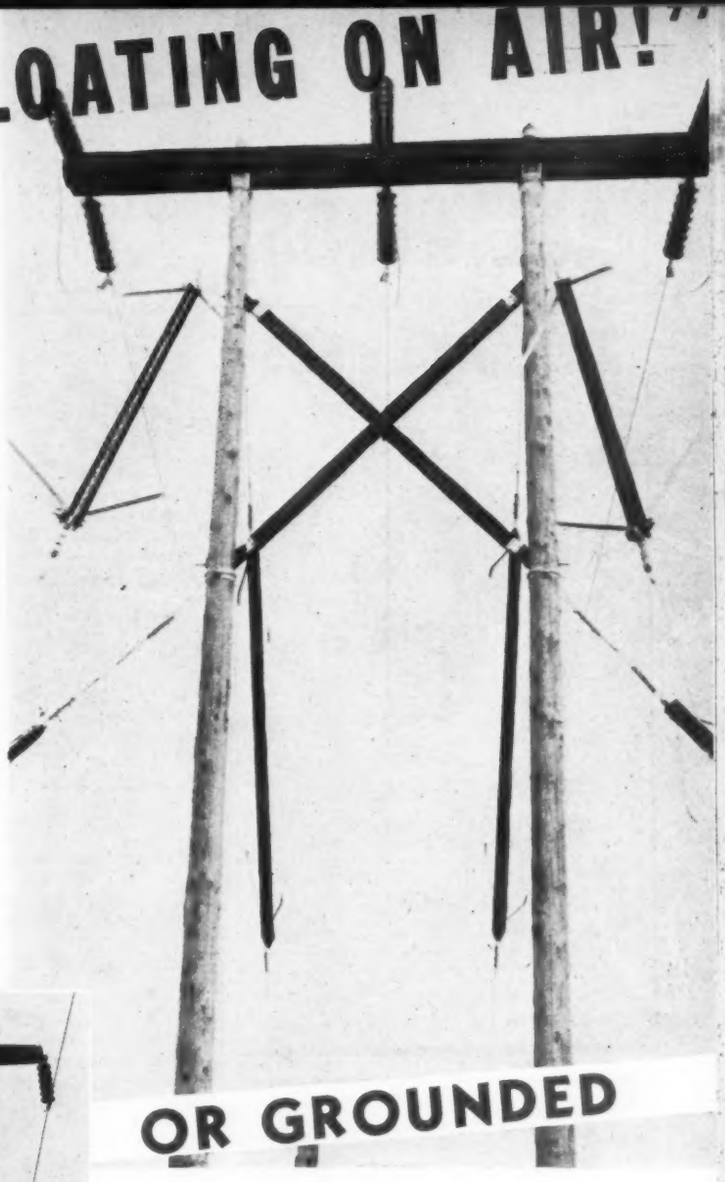
TROUBLES OF ELECTRICAL EQUIPMENT, by H. E. Stafford, second edition, published by McGraw-Hill Book Company, available at the McGraw-Hill Book Room, 68 Post St., San Francisco, $3.00. As a foot note to its title the book includes the words "symptoms, causes, and remedies." The author covers a wide field and bases his presentation on his thirty year's experience as an erecting, maintenance and consulting engineer. In this second edition, the chapter on industrial plant lubrication has been entirely rewritten and a long chapter has been added on the determination and location of cable faults. Throughout are suggestions and tables which can be exploited as time-savers in practice.

KEEP LINES "FLOATING ON AIR!" with HUBBARD OB

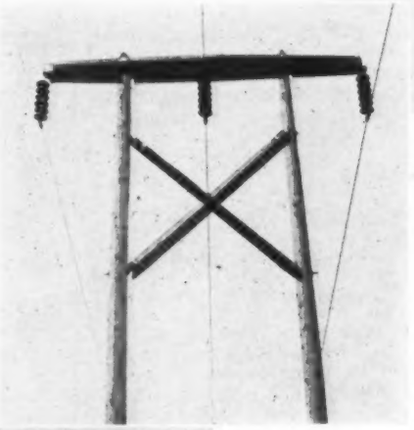
WOOD PLANK CONSTRUCTION

Hubbard OB Wood Plank Construction is unique in its great adaptable flexibility. Highest insulation values can be maintained across the phases; and between the conductor and the ground. On the other hand the structure can be brought within the limits of any designated flash-over value through the addition of suitable devices, such as ground wires, expulsion gaps, etc. Under the latter method the structure is protected against direct strokes of lightning or other impulse flash-overs.

Longer arcing path, with higher impedance, prevents many static discharges from developing into power arcs with resultant line outages. With Hubbard OB unbonded Wood Truss Arms, the chances of the wood members burning or becoming shattered is minimized.

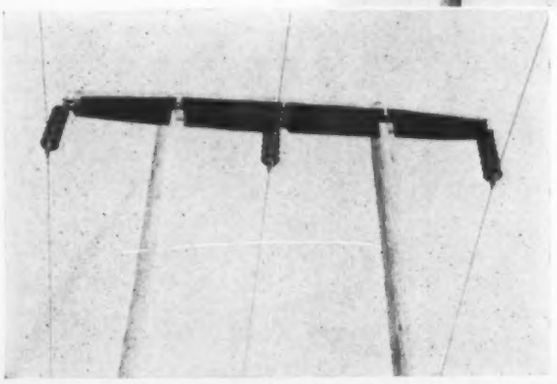


OR GROUNDED



View at right shows Hubbard OB Double Plank cantilever *Truss Arms and Hubbard OB Wood Cross Braces.*

* *Fully insulated.*



At left are shown Hubbard OB cantilever *Truss Arms.*

Illustration above shows H frame, dead-end structure with Hubbard OB Wood Plank Construction embodying (1) Hubbard OB cantilever *Truss Arms (2) Hubbard OB Wood Cross Braces (3) Hubbard OB Wood Strain Insulation—single and dual with arcing horns.*

Designed to strengthen corner or dead ends, as well as for use at well spaced intervals, Hubbard Cross Bracing requires fewer anchors. It forms a partial truss which is strong in resisting side loads. The absence of guys makes the securing of right-of-ways easier.

Write today for further details, or order from your nearest branch of the Graybar Electric Company or General Electric Supply Corporation.

HUBBARD

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD

ALL KINDS
of SMALL
TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformers to **exactly** match your requirements. If not in our regular line, we build to meet your specifications—in a hurry!!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles, Calif.

For Better Service—
INSTALL TRICO
REG. U.S. PAT. OFF.

RENEWABLE FUSES
With the famous Powder-Packed Element

KLIPLOK CLAMPS
Lock fuses and clips together

KANTARK FUSES
With genuine fibre tubes (not paper)

COLORTOP PLUG FUSES
The color tells the size

FUSE PULLERS
Pull and replace fuses safely

GLASS OILERS
For motors, line shafts, solid bearings etc

UNBREAKABLE OILERS
"Opto-Matic" Constant level type
Gravity Feed type

WRITE FOR FOLDER CPF-300

TRICO FUSE MFG. CO., Milwaukee, Wis.
M. L. Woodard, 367 9th St., San Francisco
W. E. Young Co., 1944 Broadway, Denver

SCANNING THE MAGAZINES

Bus Arrangement

"Sectionalized Buses," by W. M. Hanna, *General Electric Review*, October p. 399. Working from the viewpoint that some form of sectionalized bus is desirable at important load and generating centers, the author outlines basic factors, comparing various arrangements with respect to short-circuit currents, regulation and stability.

About Light Sources

"Cool Light," *General Electric Review*, October, p. 410. Some light sources are called cold, but coolness of light is a relative matter and cold light is unachievable. Various light sources are briefly surveyed and a table sets forth factors with respect to coolness.

National Electric Code

"Know Your Code," by John M. Turnbull, *Electrical Contracting*, October, p. 14.—An analysis of the changes in the 1940 Code, discussed and charted, step by step, from service to load as a guide to the design and installation of electrical construction.

Commercial Lighting

"What to Do," *Electrical Contracting*, October, p. 29.—How an organized approach breaks down common lighting needs into the simple fundamentals of what is needed and what to use. Case studies of good lighting in factories and other business buildings are given.

Gas vs. Electricity

"Let the Facts Speak," *Gas*, October, p. 33.—Electricity's big competitor presents its case in the problem of gas vs. electric cookery.

Advertising Campaign

"Fleur-O-Lier Campaign Shows What Co-operation Can Do," *Industrial Marketing*, August, p. 28.—The story of a score of manufacturers who banded together to bring order out of chaos for fluorescent lighting.

"Hypodermic Selling"

"What Your Dealers Think of Premiums and Deals," *Advertising & Selling*, October, p. 17.—Second article of a series on "hypodermic selling" in which druggists in the New York area are interviewed.

Mechanical Radio Recorders

"Pros and Cons of Mechanical Radio Recorders," by Archibald M. Crossley, *Advertising & Selling*, October, p. 24.—Why mechanical "interviews" with radio listeners are more successful and revealing.

Transformer Selection

"Selecting Distribution Transformer Size," by M. F. Beavers, *Electrical Engineering*, October, p. 407, describing a method wherein the fluctuating daily load curve of a distribution transformer can be converted into the thermally equivalent rectangular form for use with recommendations of the American Standards Assn. The author is with G-E, the article extracted from an AIEE paper presented a year ago in Pennsylvania.

National Defense

The October issue of *Wholesaler's Salesman* is a National Defense Number that is devoted to interesting comparisons of the war situation in 1917 as lined up with present problems. Wholesaler's Government Regulations in 1918 (p. 38) are included.

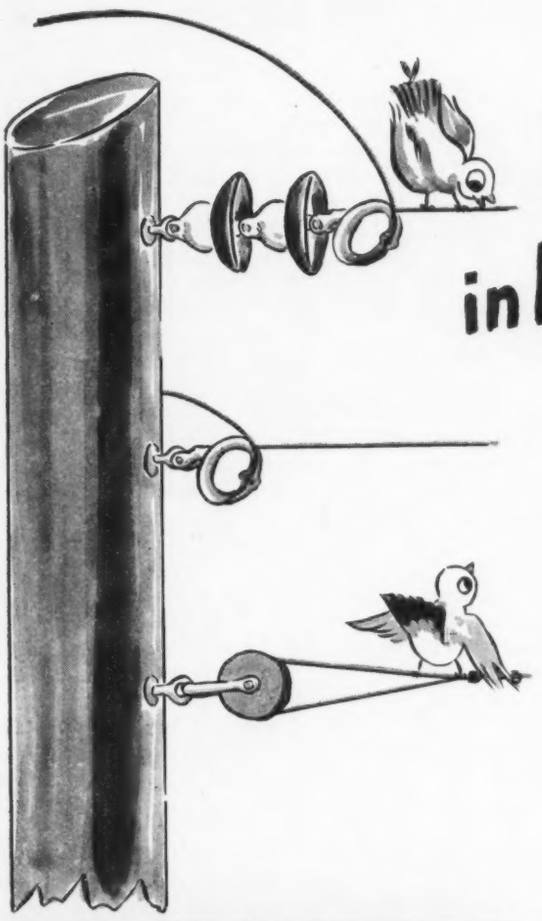
ELECTRICAL TESTING LABORATORIES
Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.
2 East End Ave. New York

GEO. E. HONN CO.
420 Market St. San Francisco, Calif.
Manufacturers' Representative for
PYREX INSULATORS
S & C PROTECTIVE DEVICES
CORNELL-DUBILIER CAPACITORS
KELLEMS CABLE GRIPS
BLACKBURN CONNECTORS
COLUMBIA TONG TEST AMMETERS
—LOW VOLTAGE GENERATORS
BAPTLETT TREE TRIMMING EQUIPMENT
METER JEWELS

G.C.A.
Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks
Send for Catalogue
We have been making safety tools for 24 years
THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

TORK CLOCKS

THE POPULAR TIME-SWITCH LINE KNOWN EVERYWHERE
NOW—lower prices and higher capacities
There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.
Bulletins on request
THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.
Representatives:
A. R. Slimmon, 445 E. 3rd St., Los Angeles
Geo. H. Curtiss, 540 McAllister St., S. F.
H. M. Sayers, 1019 Eastlake Ave., Seattle
Stevens Sales Co., 41 P. O. Place, Salt Lake City



High Voltage Quality in Low Voltage Hardware

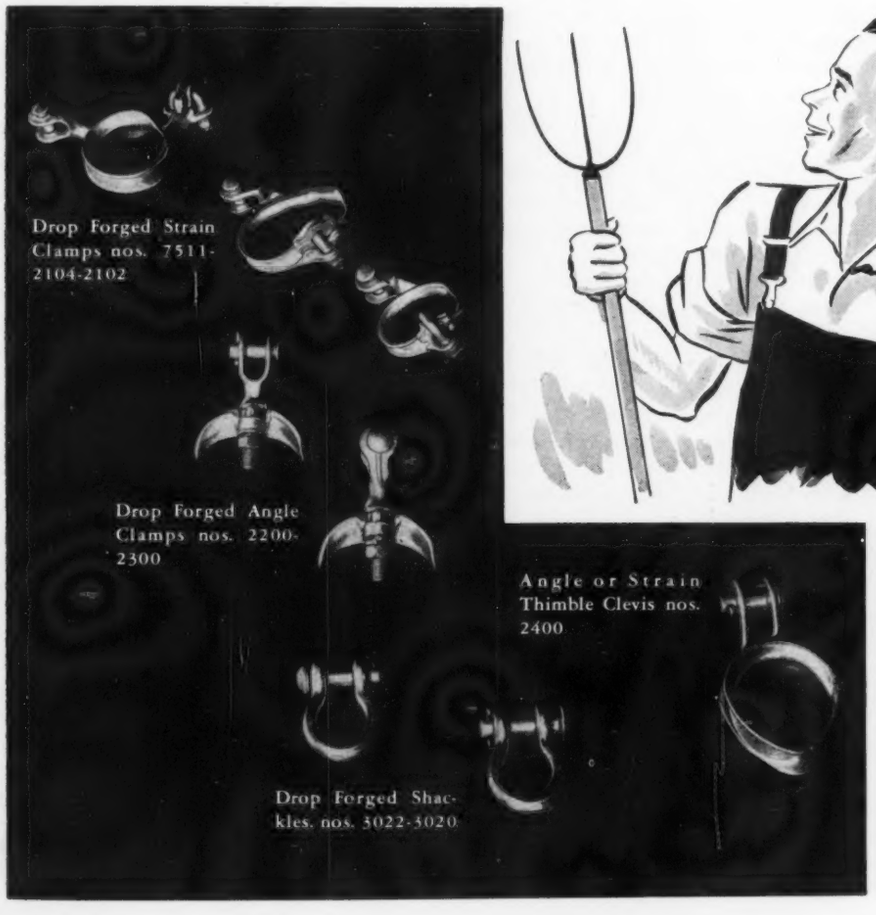
Yes, that's BTC hardware on that line in spite of the rural atmosphere.

Identified for so many years with Hi-Line hardware, it's no wonder so few engineers realize that BTC also has something to offer for rural lines.

The same—corrosion resisting, 1035 Copper-Bearing Steel; the same uniformity, strength, accuracy and galvanizing that goes into the heaviest BTC forging.

Uniform Hardware makes a Uniform Line—Specify BTC.

THE BREWER-TITCHENER CORPORATION
Cortland, New York


Drop Forged Strain Clamps nos. 7511-2104-2102
Drop Forged Angle Clamps nos. 2200-2300
Angle or Strain Thimble Clevis nos. 2400
Drop Forged Shackles. nos. 5022-5020

MORE THAN A FORGING
• • •
A *SERVICE!*

BTC

ELECTRA'S HUSBAND

Sans Electricity

"MRS. LAWSON had another letter from their folks in England," Electra said, as Raymond Gram Swing finished another radio description of a bombing raid on London. "They live in one of the coast towns. Her sister-in-law told about a raid down there. It blew up the gas works. She said they were pretty badly handicapped because they cooked, heated their water and their house with gas. Gas fires, I think she called them. It must be tough on those people."

"They should be cooking and heating their water with electricity," I interjected. "Then they wouldn't be so inconvenienced. Besides, if I was living in an area likely to be bombed, I'd certainly rather have electricity than gas in the house. I was reading some English air-raid precaution warnings. One of the first things to be done in case of an alarm is to turn off the gas, inside first and then outside with a master valve. That is, if you have one installed. Then if your house is hit by a bomb, the chance of fire is just that much less."

"Maybe you have one more argument there for the electric range salesmen to use," Electra mused. "The advertising experts say that the fear appeal is a powerful one to use. But bombs can knock out electric service too. What happens then?"

"Well, if it was a case of lines down," I answered, "they would be repaired in a short while. If a power house was put out of commission, it wouldn't make much difference in this country with the inter-connected systems. The load would be picked up by another station. But if for some reason I can't possibly foresee, electric service should be shut down completely, it would be like P. H. Erbes, Jr., described it in this clipping I cut out of an issue of *Printers' Ink*."

As Electra read the following she hemmed a time or two and nodded:

"The lights went out Tuesday evening. And that was that until Friday afternoon. Ever spend sixty-five hours in a modern city without electricity?

"It starts out mildly enough. You have to give up reading. Groping around by candle flame has its drawbacks. But you go to sleep serene of mind. Even if the power doesn't resume until some time tomorrow, you won't be needing electric lights in the daytime anyway.

"You begin to get inklings early in the new day. The porch is innocent of the morning paper. Say, how bad was that storm? And what's the war news? You snap on the radio. Silence. You decide to shave. This isn't going to be so good because it's darkish and you really need that bathroom light. Then you realize that your resources total two razors, both electric.

"Gruesome news issues from the kitchen. No orange juice — the only juicer is electric. Plain bread—toaster won't work. No coffee—percolator ditto. Well, why not make some toast on the stove? The stove, you are reminded, is also electric. You drink a glass of milk, which is warm, because the refrigerator has been off all night.

"Downtown, you climb; no elevators. Factory machinery stands idle. Adding and dictating machines are useless. In stores, cash registers don't work. No air conditioning. And, except for a run on flashlights, no customers. The one-page newspaper that finally emerged from a hand-pumped press carries no advertising.

"At home, a wash-day schedule has collapsed. No washer, no hot water. Nothing to iron with anyway. Vacuum sweeper is impotent. A refrigerator full of food quietly rots. The Mrs. couldn't even soothe her nerves by keeping her appointment for a new hair-do—no wave machines, no driers.

"Every little while as the days creep by, you discover some new gap. You eat, mainly canned meats and cold vegetables. Even the staff of life becomes a problem. Bakers can no longer operate their slicers.

"With the mercury at 103 you tend to miss the fans. Also the ice in your beverages. Water must now be used sparingly — some neighborhoods have none. Recreation? No movies. Go for a drive perhaps? No. Filling stations have gas, but can't get at it. Doctors are without X-rays and all electric therapy ceases. So does the practice of dentistry.

"When the blessed whir of the refrigerator comes on and the fans begin to sing, you vow you have never heard a sweeter symphony. Suddenly you begin to think of what is wrong with this picture.

"Here is an industry which supports almost all of the conveniences of civilized living. Chance interruption of its service literally paralyzes the vital functions of a modern community. Yet a cheap tinhorn politician, who has never created a dime's worth of human comfort in his indolent life, can gain public favor by bawling abuse of 'the utilities.'"

Electra waited when she had finished reading as if she expected me to do the speaking.

"Well," I said, "What do you think of it?"

"That man has never been in the electrical business," she replied. "If he had, he wouldn't be able to express himself like that. You fellows who work in it are so close to it that you can't appreciate what industry really means. And what's more, people don't know or understand the thing he is talking about."

"You didn't read the last paragraph," I countered. "Let me read it to you: 'Can advertising produce a voice capable of winning public toleration, much less appreciation, of this industry's limitless benefits? It has yet to do so. High time.'"

"Isn't that the truth," Electra said with finality.

IT LOOKED like a sample of printing or perhaps paper—the kind sent regularly to advertising people. I was sure of it as I admired the cleancut type, superbly printed on the poster-size sheet. And then I read:

"A people may prefer a free government, but if, from indolence, or carelessness, or cowardice, or want of public spirit, they are unequal to the exertions necessary for preserving it; if they will not fight for it when it is directly attacked; if they can be deluded by the artifices used to cheat them out of it; if by momentary discouragement, or temporary panic, or a fit of enthusiasm for an individual, they can be induced to lay their liberties at the feet of even a great man, or trust him with powers which enable him to subvert their institutions; in all these cases they are more or less unfit for liberty: and though it may be for their own good to have had it even for a short time, they are unlikely to enjoy it long."

Could this be 1940 the author was talking about? The line at the end of the piece dated it: "John Stuart Mill—essay on representative government—published 1860."

In the hey-day of bicycle racing, chains were carefully chosen for dependable service. They transmitted power. No less careful selection of electrical wiring materials should be made today. Undependable wiring may cause severe production loss, inconvenience, and expensive repair work.

General Electric quality wiring materials can help to provide the dependable electrical service needed today in new factories, homes and other buildings. All phases of modern life depend upon electrical power. Therefore, durable, trouble-free electrical wiring is needed as it has never been needed before.

For All Wiring Jobs

G-E conduit, wire and cable, and wiring devices are designed to meet uniform high quality standards. They fit together nicely making installation easy. Moreover, all materials needed for any wiring job can be found in the G-E line. No makeshift wiring is necessary.

For Home Wiring Jobs

Contractors who wire houses will be interested in the modern residence wiring method developed by General Electric which follows commercial wiring practice. It is called G-E Home Wiring and will provide complete electrical adequacy.

For further information about G-E wiring materials or G-E Home Wiring see the nearest G-E Merchandise Distributor or write to Section CDW-0231, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn. for a G-E handbook on industrial wiring or residential wiring.

ADEQUATE WIRING SERVES AND SAVES

GENERAL ELECTRIC

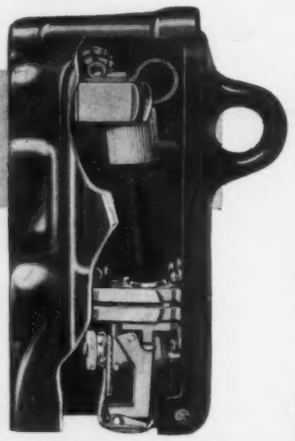
One Fuse Cutout

WITH ALL THESE FEATURES

Always PROTECTED

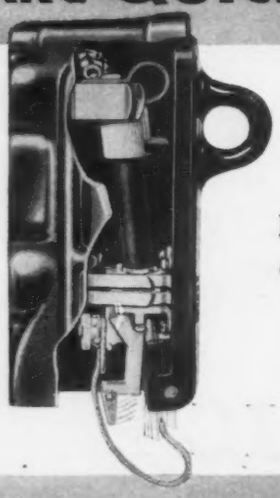
Door stays closed whether the cutout is in blown or fused position — working parts are always protected from the weather.

Cool CONTACTS



Large area of contact surfaces means efficient dissipation of heat—Cool, safe operation is the result.

ARC Quickly CLEARED

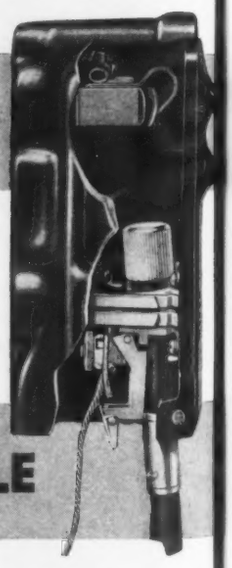


When a link blows, the arc is cleared inside the cartridge — the blown link is jerked out before the contacts separate.

NO Sticking

A metal band on cartridge, at point where sliding action occurs, assures a free and fast action.

Wide AIR GAP



A large air gap between contacts prevents any re-establishing of the arc.

Spots TROUBLE

The tell-tale position of the dropped down cartridge is easily seen from the ground — spots the trouble quickly, saves hunting.

ONE fuse cutout with ALL these features—That's the L-M Type "PVD" — Ask your L-M representative to show you a sample or put them to an actual service test on your lines. A trial order will readily prove to you why there are so many "PVD" Cutouts in use to-day.

LM

FOUR SIZES

5000 Volts, 50 Amperes	Cat. No. C-230016-6
7500/12500 Volts, 50 Amperes	Cat. No. C-230004-6
5000 Volts, 100 Amperes	Cat. No. C-230029-6
7500/12500 Volts, 100 Amperes	Cat. No. C-230005-6

LINE MATERIAL COMPANY · MILWAUKEE, WISCONSIN

KETCHIKAN, Alaska, besides being a thriving city of about 5,000 people, situated 600 miles north of Seattle, has some notable distinctions: More salmon is canned there than in any city in the world. The average annual rainfall is 155 in., with a record month of 53.85 in. Its annual residential consumption of electricity—5,230 kw.-hr. in 1939—is believed to be the largest of any city under the American flag. This latter fact, expanded and explained, may offer the electrical industry ideas for disposing of some of the surplus Federal power, and at the same time serve as a guide for accomplishing such an aim. The story is one of coordinating power supply, load characteristics, promotional rates and load-building to produce one end result —greater customer use.

Statistically the progress in reaching this goal is set forth in the accompanying Tables I, II and III. Before discussing them in detail a word or two about the history of the Ketchikan utility is in order. In June, 1935, the municipality acquired its electric, water and telephone utilities from the receivers of the Foshay interests for $960,000.

Ketchikan hydro plant is inside the city limits, hence there is no transmission. Distribution is at generator voltage with new facilities added

Homes in Alaska Use 5,230 Kw.-hr. per Year

Ketchikan utility builds record domestic consumption with combined cooking, water heating and air heating loads

By W. T. Stewart*

In the intervening period these utilities have been operated in accordance with the best standards of utility practice and with absolute freedom from political considerations. There have been no "political" rates, and as a matter of fact the present rate schedules do not differ materially from those in effect prior to municipal acquisition except for the lower step blocks which have been added to promote greater usage. As regards operating procedure, accounting practice is standard; salaries and wages are comparable to any utility; and other employee benefits include group insurance and pensions.

As Table I indicates, the 1934 domestic usage was relatively high, due to the high saturation of ranges and flat rate water heaters. The initial problem in 1935 was one of studying the relationship between present load, system hydraulic conditions, potential load, potential power output and rates. Accordingly hydraulic data for the preceding 25 years were secured and studied. These showed a usage of less than one-third the runoff of the watershed supplying the 4,450-kva. hydroelectric plant serving the city. Federal Power Commission data showed an average yearly runoff of 145 cu. ft. per sec. In 1935 the average use was 53 cu. ft. In 1939 this had increased to 94 cu. ft. With possibilities of a high percentage of utilization, this still leaves an ample margin of water for future growth.

The early hydraulic studies showed that there was sufficient water for greatly increased use but that ultimately additional storage would be necessary. This storage has recently been obtained through the construction of a modern pumping plant that utilizes offpeak stream-flow kilowatt-hours to add to storage. This system proved the most economical of several studied, including raising existing storage dams, building new dams and developing other watersheds.

With the assurance of ample capacity for additional load, an engineering study was made of the distribution system to determine what additions and betterments would be necessary. No transmission was required since the hydro plant is located in the city and distribution is at generator voltage. Some additional distribution facilities

Table I—Residential Load Growth

	1934	1935	1936	1937	1938	1939
Average number customers	962	1,045	1,124	1,188	1,223	1,281
Average annual consumption (kw.-hr.)	2,380	2,700	2,939	3,818	4,501	5,230
Average rate per kw.-hr. (cents)	2.246	2.151	1.975	1.655	1.509	1.390
Increase in av. an. consumption (kw.-hr.)	——	320	239	879	686	721
Average number flat rate water heaters	93	135	127	109	109	115

*Manager, Ketchikan Public Utilities

were added. These studies required about eight months. When they were completed two new steps were added to the original rate, offering energy at rates of one-half and one-quarter cent per kilowatt-hour with the idea of developing air heating load.

In addition an effort was made to change over as many as possible of the existing flat rate water heaters to metered service. Each individual case was calculated and the customer advised as to which class of service would be cheaper. It worked out that for a small family, the flat rate basis was cheaper, although the difference in most cases was less than 50 cents per month. Another factor of prime importance was whether major or auxiliary air heating equipment was installed. If considerable energy was used for heating, the metered rate was cheaper in every instance.

The decision to promote air heating was based upon a study of climatic conditions and competitive fuels. Over a 20-year period weather data showed that Ketchikan had its lowest mean temperature of 31.4 deg. in January and its highest mean temperature of 57.9 deg. in August, with an annual mean of 44.8 deg. Lowest temperature reached during that period was one day of zero and highest was 96 deg. These figures will disabuse the popular belief that southern Alaska is a land of ice and snow.

The original plan was to add a certain amount of water heating and then discontinue this class of service, a plan that had been used by a much larger Western city. Initial advertising announced this policy and it was emphasized continually. However, when the block of 400-500 kw. of heating load which was planned for was secured, there was some criticism—not serious, but an ever present source of friction. It was necessary in some cases to state that the utility would not furnish transformer and metering facilities for large air heating loads which had not been authorized.

Table III—Residential Rates

1934: Customer charge, $0.60 per meter; first 50 kw.-hr. 6c per kw.-hr.; next 80 kw.-hr. 3c per kw.-hr.; excess 1c per kw.-hr. Discount 5% if paid before tenth of month.
1936: Customer charge, $0.60 per meter; first 50 kw.-hr. 6c per kw.-hr.; next 80 kw.-hr. 3c per kw.-hr.; next 170 kw.-hr. 1c per kw-hr.; next 700 kw.-hr. ½c per kw-hr.; excess ¼c. Discount 5% if paid before tenth of month.
1940: Minimum charge $1.00 per month; first 50 kw.-hr. 6c per kw.-hr.; next 100 kw.-hr. 3c per kw.-hr.; next 150 kw.-hr. 1c per kw.-hr.; next 700 kw-hr. ½c per kw.-hr.; next 400 kw.-hr. ¼c per kw-hr.; excess ½c per kw-hr.
Schedule AA: 24-hour flat rate water heating with bare tank is available at $4 per kw. per month; if jacket and thermostat are installed charge is $3 per kw. per month.

Control of major air heating loads was maintained to a large degree by the policy of direct sale of high-wattage heaters. Customers got around this to some extent through the purchase of numbers of auxiliary heaters. It has been found by experience that this auxiliary heater load is extremely desirable. In an effort to promote this type of load and at the same time retain the major heating that was already installed, it became necessary to revise rates again, and this has just been done, as shown by the 1940 schedule in Table III. The schedule adopted, by changing some of the blocks, has resulted in lower rates for 93 per cent of the residential customers and higher rates for 7 per cent.

When the heating rates were originally set, they were based on the belief that competitive heating plants were maintained in good condition. The electric rates were calculated to be somewhat higher than Diesel oil, which was available at 7½ cents per gal. Utah coal was also available at $19 per ton delivered, and block wood from adjacent sawmills at $2 per dump-truck load. Experience has shown that this original belief was incorrect because the oil heating installations were not efficiently maintained. Since November, 1938 when service to new major air heating loads was discontinued, emphasis has been placed on the automatic type oil burner using fuel oil, which costs half the price of Diesel oil. As the use of this kind of equipment increases, it is hoped that the demand for electric heating will flatten out. Incidentally experience has shown that electric heating has been most popular in the medium and small homes.

Table II indicates the classification of customer usage for both 1934 and 1939. No figures are available on the number of customers that use electric heating exclusively or the number that have auxiliary heat. For the year ending June 30, 1940 there were 77 customers whose monthly average use exceeded 1,400 kw.-hr. Saturation figures on other appliances are available. The latest check shows that 59 per cent of all residential customers use electric ranges and 37 per cent have electric water heaters. Eighty per cent of the water heaters are on metered service.

Table II—Residential Customer Usage

Customers using	1934	1939
Under 600 kw.-hr. annually	375	412
601-1,560 kw.-hr. annually	224	282
1,561-3,600 kw.-hr. annually	227	241
Over 3,600 kw.-hr. annually	136	346
TOTAL	962	1,281

The utility only merchandises modern two-element water heaters, which are sold at slightly less than list, and a few lamps. All other appliances are sold by the dealers. Dealers may obtain water heaters from the utility's stock at cost. Range and water heater sales are promoted by wiring allowances of $21.25 for new range installations and $5 for water heaters. In addition the utility does a large amount of promotional advertising. Dealer term contracts are purchased which carry 6 per cent interest and terms up to 24 months.

Rates such as those in effect in Ketchikan are not applicable in most places. Where surplus hydro power is available, they can be employed to create greater usage. A real possibility exists of creating profitable business if someone will invest a good reverse-cycle heater at a competitive price.

Ketchikan is notable for a number of reasons: more salmon is canned there than any other city in the world; rainfall reaches 155 in. a year and residential electric consumption is 5,230 kw.-hr. per annum. Electric range saturation is 59 per cent; water heater saturation, 39 per cent

"Ranges Recover Revenues"

Summer sales boom created by Washington Water Power Co. and 2044 electric ranges move into neighboring kitchens

CONVERTING the summer slump into a major sales boom, which ended as the most successful drive in the history of the company, has been accomplished in Washington Water Power Co. territory. During a 90-day period of hot weather, 2044 electric ranges were sold by company and dealer, an achievement which adds materially to the already high range saturation in the Inland Empire and perhaps serves as a challenge to other utilities as to what can be accomplished in mid-season doldrums.

Only ordinary inducements were made to the customer in this 3-month campaign, called "Ranges Recover Revenues," with nothing offered by way of price reduction, premiums or free wiring. It is true that during the planning stage of the promotion, special inducements were considered, but were discarded. Sales manager R. B. McElroy and his staff decided that in this drive for a new range sales record, the bait should be featured for the fisherman, rather than for the customer. It was decided that an electric range in itself was a good buy, and that if salesmen could be made to work hard enough, the job could be done despite the fact that July and August are normally slow.

To announce the campaign, separate broadsides were prepared and mailed to all range dealers in the territory, company sales people and regular company employes. Letters were included from the president and vice president, expressing personal interest in the activity and confident that the job would be done. The management did not overlook the fact that 2,000 ranges were expected to be reaped in a field that had produced only 776 ranges before. Reply cards were attached to the broadsides, and by means of them campaign participants were expected to report sales and prospects for appliances direct to the vice president. This personal touch proved important.

"Walter Winchell will be a broken-down bloodhound compared to employes seeking range prospects," read the broadside to employes. For each tip resulting in a range sale, a cash bonus of $2 was offered. The eighteen employes with the greatest number of tips at the end of the campaign were to be feted with a banquet by the vice president. That was another important personal touch.

Company salesmen, on the other hand, were given responsibility of 25 ranges per man. Individual quotas were assigned on the basis of 4,300 points—200 points for a range sale to a new customer; 100 points for a range sale where similar equipment was replaced. Dealer sales in which the sales person assisted counted toward quota. Salesmen were offered a penny per point, providing quota was made, with 2c per point over and above quota.

As evidence that "bait to the fisherman" rather than to the prospect was a good approach, final figures showed that 45 out of 48 salesmen made quota, with the top salesman exceeding 4,300 points with a total of 14,400 points—and this with two full weeks taken out of his 90-day time allowance for the army.

Of novel nature were activities generated by managers of the company's six divisions. Manager J. D. Lewis, of Pullman, organized his staff along military lines—big guns, hospitalization, and a range girls' patrol. Dressed in uniform, he toured his territory with talented girls and gained considerable front-page publicity. In Spokane, the sales force persuaded their assistant general manager and division manager, Lewis A. Lewis, to step into the proverbial barrel badly in need of clothes, have his picture taken, and then pose again from time to time as the campaign progressed and won for him new garments.

The Big Bend division ended with 231 per cent over quota; Okanogan earned 182 per cent, Spokane 176 per cent, Lewiston 152 per cent, Coeur d'Alene 112 per cent, and Palous 102 per cent. This made a total of 1,044 range units for the three months. The Washington Water Power Co. had at the beginning of 1940 a range saturation of 35 per cent with its 67,000 customers.

J. D. Lewis of Pullman division swung his big guns into action with his staff adopting a military motif for the range drive. Here he stands with attractive members of his range girls patrol

"Sel. A. Watt"

Switch-box sales character helps sell small appliances

While others moan about the low-use customer and what to do with him, Pocatello division of Idaho Power Co. steps out and sells him small appliances like nobody's business. For seven years, the division has done an outstanding job on small appliances with particular emphasis upon low-use customers. This activity has resulted in the highest kw-hr. use per customer among all of Idaho Power Co.'s divisions. And Idaho Power's kw.-hr. consumption per domestic customer in 1939 was 1836. For 14 consecutive years the division has won the annual company lamp globe campaign. It is no slouch in heavy duty appliances either.

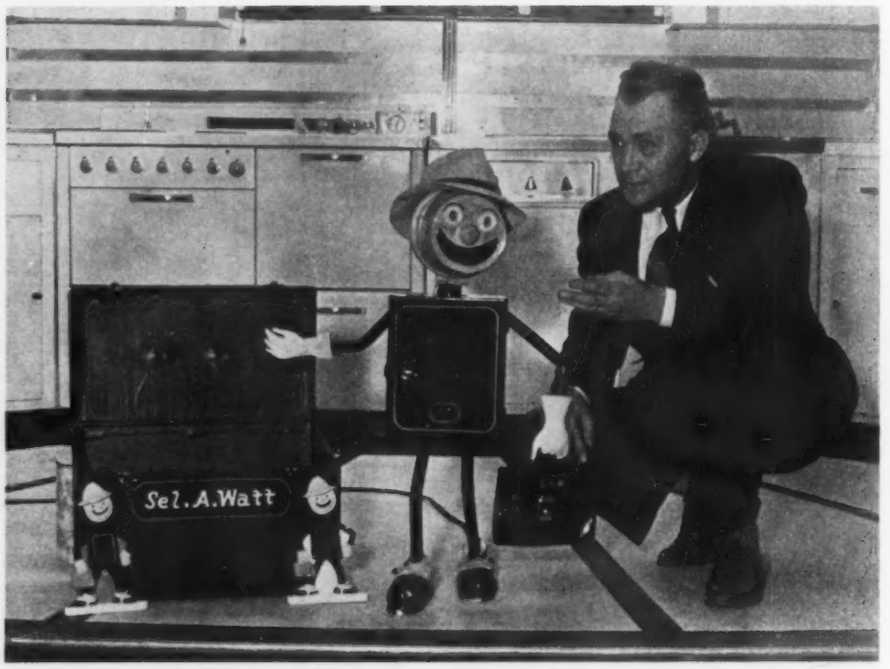
Steve Rhoads, division sales manager, cooks up the division's special campaigns. With a sense of the dramatic, he has also created a sales character, "Sel A. Watt," a little figure made up of a switch box, pieces of conduit and with a meter for a head. Sel A. Watt is equipped with a loudspeaker and at sales meetings holds dialogue conversations with Rhoads or other members of the sales staff.

Latest campaign over which victory was celebrated Sept. 4 was one by company and dealers to sell 300 hot plates and roasters between the dates of June 15 and August 15 with the special purpose "to contact all low-use customers and sell them the fact that electricity is cheap in Idaho." In a sales bulletin titled "Our Job," Sel A. Watt reminds employees of a paragraph in Strike's letter on "Sales Objectives": "The selective load building to the end that the low-use customers will be developed to a point that their use more nearly equals the cost of rendering service."

By July 25, a "war bulletin" showed American Falls 166 per cent ahead of quota and on Sept. 5 the bulletin closing the campaign listed American Falls 480, Aberdeen 210, Blackfoot 231, Salmon 138, and Pocatello 139 per cent ahead of quota, with a total sale of hot plates and roasters of 529 or a total division percentage of 176 above quota.

This has been going on for several years. Last fall the campaign was to sell 500 small appliances in 50 days and resulted in 531 small appliances sold. The contest ran from Oct. 27 to Dec. 24. A special "gift campaign" was added the last 30 days in which to sell 300 small appliances. An extra 50 cents commission was paid on each small appliance sold, and a deluxe small appliance set was given to the winner of the contest.

Steve Rhoads, Pocatello division sales manager of the Idaho Power Co., created this novel character to build small appliance sales in his territory. "Sel. A. Watt" proved sensational



On June 15 of 1939, a special "Kw. hr. in your own backyard" campaign on low-use customers resulted in 306 company sales, 131 dealer sales and 145 per cent of quota. The division had set out to sell 300 hot plates and roasters. In the territory, there were 2,508 low-use customers using less than 50 kw.-hr. per month at that time. Today there are far fewer customers whose use does not pay for the cost of serving them in this enterprising division.

Easy Presentation

Fred Fenton introduces 1941 line to enthusiastic dealers

Automatic washing machines will soon be made by all of the leading manufacturers. That Easy will join the trend sometime next year was predicted based upon its first step introduction this year of a semi-automatic embodying all of the automatic features except the wringing of the clothes, Fred S. Fenton, Jr., Pacific Coast manager for Easy Washing Machine Corp., told a series of dealer presentation throughout the West to introduce the 1941 line. Typical of such meetings was that held at the Western Merchandise Mart, San Francisco, to over 200 of the retail appliance field.

Two significant novelties were offered the trade. A new portable ironer in the less-than-$30 bracket and the new time and temperature control "Spira-Matic." Claiming that its ironer business had increased 113 per cent to the industry's 8.6 per cent during the past year without including the portable and the same percentage to the industry's 3.3 per cent increase including the portable,

Its semi-automatic washer containing "34 major improvements and 15 exclusive features" introduces the sterilamp to the washing machine for the first time, claiming to help sterilize a washing by ultra-violet light.

FRED FENTON

In his San Francisco presentation, Fenton was assisted by Dan J. McShea and J. J. Marshall, in the presentation of the 1941 line. Similar showings were made by Fenton in Seattle, Spokane, Portland, Fresno, Sacramento, Los Angeles, Boise, Butte, Salt Lake City and Phoenix.

Sales Rallies

Westinghouse inaugurates retail dealer training courses

"Sales Rallies" are the follow-through on retail dealer salesmen training initiated by Westinghouse Electric & Mfg. Co. In its previous training plan recordings were made of sales presentations on ranges and refrigerators by retail salesmen. (See ELECTRICAL WEST, Sept. 1940.) Elbert Kramer, manager of sales application, has completed a 5700-mi. loop of Pacific Coast states conducting these new sales rallies for selected Westinghouse retailers of traffic appliances.

Explaining to the retail sales audiences that it is wrong to attempt to sell table and other traffic appliances without first-hand knowledge gained through personal use, Kramer stresses the idea of selling the use and advantages of such appliances to the customer rather than technical explanations of construction and design. He traces first an outline of the thought of the buyer while she changes from a prospect to a customer. Thus the rally audiences receive instruction on how to classify the customer so that the presentation may be made according to the customer's specific interests. These interests are explained as the "how, when, where and why" of the particular appliances used.

Unique feature of these sales meetings is their sales stimulation to all makes of appliances. For instance, the subject of automatic waffle irons, explained with a description of the proper way to insure successful operation and use, applies to all temperature indicating waffle irons. Another contribution to those attending this demonstration is a method he explained for eliminating scratched sole plates on irons on display, saving many dollars lost through damage of display irons.

Sales rallies have proved popular and are highly approved by department store executives and buyers according to J. G. Miles, Seattle Westinghouse merchandising division manager.

Typical "sales rally" conducted by Westinghouse is this group meeting at Seattle. Standing at right is Elbert Kramer, Pacific Coast manager of sales application, who managed the various rallies

IES Program

Stryker of G-E presents 5-year IES plan to Spokane

Some 250 Spokane dealers, jobbers' representatives and lighting sales persons crowded the Round-Up Room of the Desert Hotel recently to hear about the all-industry national lighting program. Lighting dealers and employes of lighting departments of stores were guests of the Washington Water Power Co. at a dinner meeting to hear E. W. Stryker, of General Electric sales promotion department, present the five-year lighting program plannd by IES lamp manufacturers, bulb and adapter manufacturers, wholesalers and utilities to be supplemented by dealers. Outstanding feature of the promotion was the active campaigning of IES lamps, adapter units and correct size lamp bulbs.

Stryker, assisted by W. Potter, also with General Electric, used several skits to emphasize certain selling points for dealers. Stressing the importance of lighting as a year-around activity, the skits depicted sales approaches for adapter units and for selling larger, right size bulbs, stressed the importance of a permanent lighting service center and the use of the lighting guide, and suggested the use of the home service adviser to demonstrate lighting to the customer and to sell a complete light conditioning unit for the home. Appeals to be used include fill empty sockets, replace or modernize fixtures and add IES lamps for more lighting. Setting up permanent light conditioning centers and tie-ins with national activity were discussed as ways to identify dealers with the national program.

Market possibilities for dealers in the Inland Empire, where lighting is less than 10 per cent saturated, show 313,650 IES lamps, representing a valuation of $50,000. In addition, the 69,700 prospective customers in the territory provide a market for 1,400,000 adapter units and 1,400,000 lamp bulbs during the fall of 1940.

Several skits were used at the Spokane meeting to put over certain sales points on IES lamps and light conditioning service. Sales approaches for adapter units for large-size bulbs were presented

Univ. Southern California Sponsors Sales Courses

Initiated by the electrical industry, a salesmanship course is offered for the first time by the University College of the University of Southern California. Begun Sept. 20, the course is a night extension course running for 12 weeks on Friday nights from 7 to 9:20 p.m. at Bridge Hall, U.S.C.

This salesmanship course is an outgrowth of the sales training program developed by the Electrical Development League of Southern California for retail dealer salesmen. Interest in the idea spread and the sales council of the domestic trade committee, Los Angeles Chamber of Commerce, appointed a special committee to negotiate with educational institutions for such a course. Active in this sales committee were H. C. Rice, merchandise manager, Southern California Edison Co.. C. H. Dye, Bureau of Power and Light, and F. L. Hockensmith, Electrical Development League.

Classes will be addressed by sales managers of leading businesses in Los Angeles in addition to lectures by competent instructors and class work. Subjects chosen were selected after research among sales managers and salesmen. The two sections of the course include: *Salesmanship I*—salesmanship, principles of marketing, principles of advertising, and fundamental economics. *Salesmanship II* — Public speaking, applied psychology, advanced salesmanship, market analysis. The first class was limited to 40 salesmen, the fee for each quarter course of 12 weeks was $12 plus a $3 registration fee.

Upon completion of the course, a certificate in salesmanship attesting advanced training is to be given those who pass satisfactorily. This certificate will be recognized by sales managers in that city as evidence of knowledge and ability. College credit also will be given for the course toward a degree.

San Diego Handles Coordinated Program

Too many meetings a dealer or dealer-salesman is expected to attend make it difficult to plan a coordinated sales training program, J. Clark Chamberlain, manager of the San Diego Bureau of Radio and Electrical Appliances, has found. Consequently in preparing the series of sales training lectures, Sept. 6, 9, 11 and 13, the 47 distributors and manufacturers whose men serve the San Diego territory were asked by the Bureau to lay off any individual meeting during that one week so there would be no conflict with the series proposed by the Bureau. Cooperation was obtained from all and thus an exceptionally high attendance was obtained during the series.

Dealers who are members of the Bureau were also assigned contacts to bring to the meetings other dealers and salesmen, not only in San Diego but in out-lying cities. Publicity for the series was also given in four bulletins, in telephone calls, as well as cards of endorsement signed by distributors and dealers who had previosly heard Samuel Worswick, sales counsellor, who conducted the training course. Worswick had spoken to the Electric Club of San Diego some three months previously and was so well received that he was engaged for the series on sales training.

Thomas Edison Collector Seeks New Items

Long a collector of Thomas A. Edison historical material, Ward Harris, manager of the Ediphone Co., 519 Market St., San Francisco, plans an exhibit of early Edison inventions and notebooks, papers, drawings and equipment to open early in 1941.

He is seeking for early Edison machines of various kinds, for which he says he is willing to pay a reasonable price, in order to include them in this Edison museum. Especially is he looking for bipolar motors and generators, early Edison lamps, movie projectors, the early Edison telephone with a chalk transmitter, the Edison electric pen or any other Edison items suitable for such an educational exhibit.

Already the possessor of a fine collection of such items, Harris expects to announce the opening of the museum and to invite the industry and educational groups to visit it.

Two Educational Classes Begun in Southern Calif.

Two educational courses for the fall season have been worked out by an executive committee of the Electrical Maintenance Engineers Assn. of Southern California. The first will deal with Fundamentals and will be held at Frank Wiggins Trade School with Harold Tubbs, instructor. The second and more advanced course will consist of Electrical Maintenance and Repair subjects, and will be given at Santa Monica Technical Evening School, Walter E. Coburn, instructor.

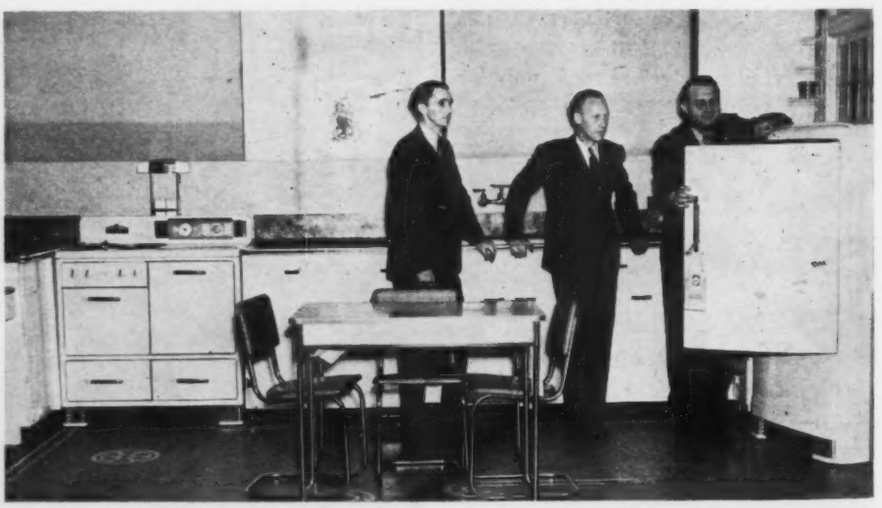
"FUNDAMENTALS" (total of 80 hrs. work) will consist of:

Review of Mathematics. Work and Power —a. Review of fundamentals of physics. Properties of matter, Electron Theory. Direct Current Electricity—a. Magnetism, b. Electromagnetism and induction, c. Ohms Law and Resistance, d. Series and Parallel Circuits. Alternating Current Electricity—a. Resistance and Inductance, b. Reactance and Impedance, c. Power in AC Circuits, d. Power and Power Factor Problems. Motors AC and DC—a. Theory and operation, b. Application, c. Windings. Transformers. Instruments.

"ELECTRICAL MAINTENANCE AND REPAIR" (216 hours):

Electrical Mathematics. A.C. Currents—Review. Three Phase Motor Calculations. Industrial Electronics. Lighting—Theory and Practical Problems. Electric Codes. Feeder Problems. Plant Maintenance. Instruments and Testing. Motor Connections. Synchronous Motors and Control. Explosion Proof Equipment. Dust Proof Equipment. Electric Welding Equipment. Electric Heat and Control, Heat Treatment. Transformers. Motor Generator Sets. Rectifiers. Frequency Converters. Plant Visitations.

● A HANDY LAUNDRY COST CHART which enables a salesman to compute quickly for his prospect the cost of doing the laundry outside the home for one week, one year, ten years, and fourteen years is now being used by ABC Washer and Ironer dealers.



A MODEL KITCHEN in Okanogan, Washington, is to be found in the salesrooms of C. E. Blackwell & Co., Inc. Left to right, A. J. Bacon, a Blackwell salesman; C. E. Blackwell, and J. W. Saunders, the Frigidaire representative for Sunset Electric, discuss refrigerator advantages

PRINT IN BINDING

ELECTRICAL
WEST

SALES GUIDE

DO'S and DONT'S for CHRISTMAS

★ DO make store decoration attractive and distinctive ★ Every one talks about stores that catch the eye of Xmas shoppers ★ Word of mouth advertising is particularly fine at Christmas time ★ Make the store seem festive, lively, gay ★ Light up more than usual, it attracts ★ Find out as early as you can which are the best lines and push them in windows and up front in the store ★ Mark prices plainly—the holiday season isn't particularly appropriate for spending so much time on salesmanship ★ Depend more on displays and price each item plainly ★ It is a time of waiting on the customers as quickly as possible ★ Many who are waiting to be waited on will glance around and see what they can find ★ Give them as much chance for self-service as possible ★ If you carry sidelines, feature them on a special table ★ Take the attitude that all who come in do so to purchase ★ Give them every opportunity ★ Make it easy for customers to examine your merchandise at close range ★ Don't keep it hidden in display cases ★ Bring it out in the open for quick service ★ Don't be afraid to feature higher priced merchandise than ordinarily ★ Gift buyers generally want something a little better or nicer than year round purchasers ★ If she doesn't find it in your store she will seek it elsewhere ★ Don't forget that women are principal buyers, men also make purchases★ Don't confuse, segregate displays ★ Show matched sets together ★ Sell pattern ★

Why not make it a Merry Xmas for yourself; there is no logical reason why your regular customers should not consider buying many of their gifts at your store instead of elsewhere

A real "gift" to you as a dealer is the advertising that is being done at this season by appliance manufacturers, utilities and other merchants. It all builds acceptance and reduces sales resistance. You also capitalize now on the years of previous advertising, the articles in women's magazines. It is ideal time for local cooperative campaigns through league or bureau or society

TABLE COOKERY

NOVEMBER
1940

OH, BY THE WAY—

why not

Check your

1. Sales story

2. Store sales manners

1. Just as fresh stock is put in for the holiday season and previous merchandise is spruced up, the store decorated and made as attractive as possible, it is good to burnish up your sales story on gift and table appliances so that it dazzles too. Then is when it's good to remember that in addition to the product features of the lines you handle, which the manufacturer or jobber will give you for the asking, such appliances have potent **use** and **prestige** values too. Mix these up with your product story and you will cinch more of those sales that hang on a thread between you and a lot of other gift merchandise.

Mingle these thoughts in with your sales story.

Ideal for buffet table entertaining, the modern way. No other entertaining is so easy, flexible, gay.

Can be a guest at your own party, serving from the table instead of running out to the kitchen.

No need for that last-minute hurry; gives you time to make yourself ready, do justice to yourself.

Ideal for a buffet breakfast—for a quick start on a trip, an early golf game, or for hubby to get own breakfast without difficulty, permitting more sleep.

Just the thing for a late snack after the show or dance.

Simplify meal planning, cook just enough to suit the occasion, piping hot. Save needless steps.

Add sparkle to the well arranged table.

Cooler cooking in summer. Each appliance serves many uses. Interesting recipes add variety to the menu.

Gives you a reputation as a clever hostess.

SUGGESTED BY

2. Store manners are put under a strain during the rush period. Tired shoppers, often testy tempered themselves, expect just as much courtesy from you as ever. Here are a few reminder "Do's" to make smoother sales:

Watch the door. Don't let anyone stand about unattended any longer than is necessary.

Smile when approaching the customer. Make her associate electrical merchandise with pleasure.

See how courteous you really can be. Make the customer feel you are delighted to be of service, to help her select just the right thing.

A pleasant, "How do you do?" is sufficient greeting. It is better than the more common, "May I help you?" Give the customer a few seconds to lead with what she wants before you start making suggestions.

When you do, ask questions like this
"Looking for something for yourself, or for a gift?"

"Would you like something useful for every day as well as appropriate for an occasion?"

"Do you like to entertain? (or does the person it is being bought for?)"

If the customer asks for suggestions show your best merchandise first. Pay her the compliment of thinking she wants it. Give it a chance to register, don't skip too soon.

Never interrupt conversation between patrons. Wait until you are called upon for your opinion.

Be patient with the slow customer who hesitates to make a decision. Anyone can sell the easy customers.

If a customer is waiting and you are busy, just a smile or a word will often serve as an acknowledgement and alleviate impatience.

After you've made a sale talk on to the customer until she's ready to leave. Compliment her choice.

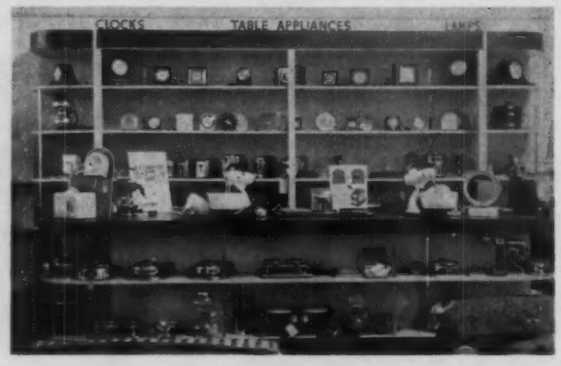
Take personal pride in the store. When not waiting on a customer, why not tidy up ready for the next?

YOUR SALES ALLIES

PUGET SOUND POWER & LIGHT CO. • WASHINGTON WATER POWER CO. • PORTLAND GENERAL ELECTRIC CO. CALIFORNIA OREGON POWER CO. • UTAH POWER & LIGHT CO. • IDAHO POWER CO. • THE MONTANA POWER CO. ROCKY MOUNTAIN ELECTRICAL LEAGUE

HERE'S AN IDEA

Something to DO about Display and Ads



First rule for anybody—"keep the merchandise CLEAN".

That may be hard to accomplish at a rush period, but it never ceases to be vital to success.

Next rule is to display adequately. That means both attractively in the windows and store and accessibly in the sales area.

Pictured here are some modern ideas in such display—attractive yet inexpensive, adequate, and inviting.

Open and easy-to-get-at for demonstration or examination are the portable wall shelves and counter shown above. Painted in contrasting colors, with light color against which the new appliances show to advantage, and darker trim, they can be made up in sections which permit rearrangement to freshen up the display.

A prize winning window for small appliances, yet simply achieved (Warnack's Orland) is that pictured in the center. White corrugated cardboard for background and floor, sprinkled with sparkling tinsel, pillars of the same to hold up appliances at the rear, a wreath cut into the background to permit a view of an illuminated contrasting color behind it.

Some Advertising Pointers

The public is responsive to new suggestions for gifts; present the idea attractively and often enough to keep them reminded.

Begin advertising and sales promotion early.

Make plenty of good buying suggestions.

Feature merchandise, not prices, in the ads. Merchandise is being bought as gifts, rather than for personal use.

Fill ads with the Xmas spirit. Feature the gift angle, not bargains, merchandise of special attractiveness and quality.

Use alluring, appealing copy. Plan the advertising to sell and make people buy.

Fit your Christmas ad expense to the opportunity. Don't pass it up with the ordinary advertising of other seasons. Do your Christmas advertising on a bigger scale.

YOU MIGHT TRY

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Mazda Drive

Denver crew sells thousands of new 75-watt bulbs

Mazda lamp salesmen in Denver have been filling thousands of empty sockets with Mazda lamps, setting new records in the merchandising of larger-size electric light bulbs. Under the direction of Roy G. Munroe, a Mazda crew sold 135,526 lamps in 1939, and this year that figure is said to have been bettered.

Door-to-door solicitation, effective newspaper advertising, attention-getting window displays, and employee campaigns are jointly responsible for the splendid sales results. Particular stress was placed on the use of lamps of higher wattage in furnace and laundry rooms, landings, garages, fruit rooms, stairways, pantries, and on porches.

Selling points beyond safety and convenience were the fact that the new 75-watt inside-frosted Mazda lamp is but a little larger than the former 25-watt and that it provides 35 percent more light than would three old 25-watt lamps.

● SUCCESS of the washer and ironer campaign of the Electric Appliance Society in Northern California is revealed by preliminary figures from some divisions. In awarding the salesmen's prizes in San Francisco as based on ironer sales, the 1939 total of ironer sales was revealed as 128. This year it was 245. The first prize went to John Sullivan, salesman for Nathan Dohrman Co.

Campaigns

British Columbia Elec. Railway Co., Ltd.—Christmas theme in all store displays during November with advertising campaign to begin late in the month. Special Christmas displays will be in all company windows through December. Annual gift activity on all appliances will continue.

Idaho Power Co.—Fall lighting campaign and cooking and water heating campaigns will continue in November and run through December. Dealer activity in the cooking and water heating activity is particularly solicited. Commercial and industrial division of company held a series of fluorescent lighting schools in Pocatello, Twin Falls and Boise, Nov. 4-8.

Nevada-Calif. Electric Corp.—Range and water heater campaign set for November and December.

Pacific Power & Light Co.—Light conditioning and IES lamps campaign for November. Dealer meetings to show light conditioning centers were held late in October.

Puget Sound Power & Light Co.—Lighting conditioning and range program scheduled for November and December, with "Alice in Wonderland" cooking schools in November.

San Diego Bureau of Radio & Electrical Appliances—Eighth Annual Electrical Show Dec. 3-8.

Utah Power & Light Co., The Western Colorado Power Co.—Light conditioning, ranges and water heater campaigns set for November and December.

● HOUSEHOLD ELECTRIC RANGES now have uniform test specifications as the result of the work of a joint committee of the Edison Electrical Institute and National Electrical Manufacturers Assn. It is issued as EEI Bulletin No. H1, or NEMA publication No. 108, published May 1940, and adopted the NEMA standard Feb. 9. The purpose of the specifications, the summary states, is to establish a procedure to make possible determination of a performance of household electric ranges in terms of safety, effectiveness, durability and convenience; also, the report contains suggested standards as to supply features.

APPLIANCE SALES REPORT, 1940

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

REPORTING COMPANIES	Idaho Power Co.	Northwestern Elec. Co.	Montana Power Co.		P. G. & E. Co.		Pacific Power & Light Co.		San Diego Cons. G. & E. Corp.		Southern Calif. Edison Co., Ltd.		Utah Power & Lt. Co.		Wash. Water Power Co.
		Aug.	Curr.	6 Mos.	Curr.	6 Mos.	Curr.	7 Mos.	Curr.	6 Mos.			Curr.	5 Mos.	
Ranges			192	2,050	481	3 640	236	1,710	60	380	127	1,359	339	2,772	
Water Heaters			457	7.393	258	2,175	132	1,056	50	340	43	439	66	685	
Air Heaters, aux.					121	3,088									
Air Heaters, 220					79	948									
Refrigerators					6,660	59.575	702	7,447	1,000	7,975	3,126	37,381	1,163	12,152	
Dishwashers					27	191							4	22	
Washers			622	4,780	3,997	28,168	543	4,727	450	3,525	2 803	22,169	748	7,085	
Ironers			88	534	625	4,230	48	368	65	550	379	2,803	55	568	
Vacuum Cleaners			190	2 036	2,442	22,836	173	1,299	275	2,085	1,044	8,009	449	4,193	
Radios			1,940	11,226	12,562	92,933	1,411	9,253	1,150	7,975	5,696	48,703	1,367	12,055	
Mixers					349	2,989			140	840	189	2,095	48	1,021	
Cookers, Casseroles			37	413					75	505	55	302	17	138	
Irons									600	4,050	1,130	8,683	1 073	7,789	
Waffle Irons									175	1,035	379	2,841	259	2,521	
Toasters									525	3,275	546	4,155	460	4,324	
Table Stoves			226	2,298	[illegible]				80	730	176	1605	418	3,088	
Heating Pads									55	785	96	1,148	74	1,596	
Curling Irons											30	251			
Coffee Makers									475	3,675	296	2,198	446	3,158	
Sewing Machines					794	5,111			125	950			108	1,181	
Clocks									550	3,800	427	3,988	254	2,262	
Fans											282	2,293			
Floor Polishers															
Sun Lamps											189	227	7	49	
Reflector Lamps											179	1,633			
Misc. Lamps													6	317	
Shavers															
Yard Lights															

SOURCES

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales of all reporting dealers for 3 months.

[2] Lists appliances sold by dealers in Portland area. Figures compiled by Northwestern Electric Company.

[3] Combined dealer and company sales from report of Montana Power Co.

[4] Figures are being consolidated with San Joaquin Power and are not available this month.

[5] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figures include fans, curling irons and sun lamps.

[6] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.

[7] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

Harmonics and Capacitors

Capacitors don't cause harmonics, but they nourish them. Overvoltaged transformers are a source of trouble. Delta connections and careful location need to be considered

By C. G. Smith
PG and E, San Francisco

WHILE it is desired to have sine waves of voltage and current on the distribution lines, in practice these waves are distorted by harmonics. The harmonics are sinusoidal waves of frequencies which, on a power system, are higher odd multipliers of 60 cycles. The harmonics add to the 60-cycle fundamental wave at varying phase angles to give a distorted total wave. The harmonics and the fundamental combine according to the root mean square law.

In all locations on the distribution system of a power company, the voltage wave contains certain harmonic components. In some cases these harmonics are so small as to be negligible, but in other cases they are quite prominent. Since distribution capacitors are coming more and more into the picture of distribution engineering, it is well to give some thought to the effect of harmonic voltages and currents on the performance of distribution capacitors.

Response of a Capacitor to Harmonics

The nature of a capacitor is such that its impedance depends on the frequency of the applied voltage. The impedance is given by the equation

$$Z = \frac{1}{2 \pi f C}$$

where f is the frequency and C is the capacitance. Thus the higher the frequency the lower will be the impedance. At a frequency of n times the fundamental the impedance of the capacitor will be 1/n times the impedance at 60 cycles. Fig. 1 shows the impedance of a 15-kva., 2,300-volt capacitor at different frequencies.

The response of the capacitor to a voltage wave made up of various frequencies, such as the fundamental and higher odd harmonics will depend on the amounts of the various harmonic voltages present. Each harmonic voltage will act on the capacitor as if no other voltages were present and will produce its harmonic current according to the impedance of the capacitor at that harmonic frequency. The currents drawn will combine according to the root mean square law.

Thus it is readily seen that if the applied voltage wave is good, that is, contains no harmonics, the current drawn by the capacitor will be essentially a sine wave of the fundamental frequency current. If the applied voltage wave is bad, that is, contains appreciable harmonic components, the current drawn by the capacitor will in turn be bad, and the per cent harmonic currents drawn at the different frequencies will be n times the per cent voltage at that frequency, where n is the order of the harmonic. Thus if the voltage wave contains 10% fifth-harmonic voltage the current drawn by the capacitor will contain 50% fifth-harmonic current. The fundamental, or 60-cycle, value of both current and voltage is taken as 100%.

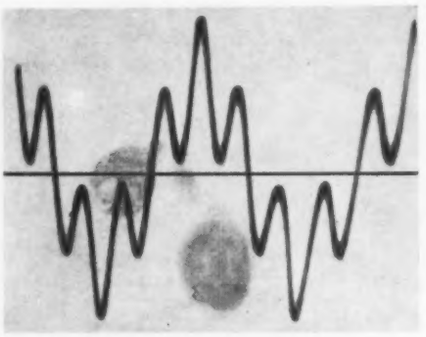


Fig. 1—Current wave for one phase of a capacitor bank

It should be pointed out here that the capacitors are not in themselves a source of harmonic currents. They will allow a certain harmonic current to flow depending on the harmonic voltage already present, and their impedance at that frequency. In some cases, however, they may seriously increase the flow of harmonic currents due to resonance.

Examples

Some examples of the effect of harmonics on capacitors are shown by Figs. 1 and 3. Fig. 1 shows the current wave for one phase of a 45-kva., 4-kv. capacitor bank. This wave contains 60% fifth-harmonic current and causes the capacitor to be overloaded by 30%. This 45-kva. capacitor bank alone causes 4 amp. of fifth-harmonic current to flow through the distribution lines to its location.

Fig. 3 shows a resonance condition obtained on a 4-kv. feeder equipped with capacitors and induction-type regulators. The kva. of capacitors connected to the feeder was varied and harmonic analyses made at the station of the feeder current. A series resonance condition with the fifth-harmonic current was obtained as shown by the figure. With 370 kva. of capacitors connected to this feeder the inductive reactance of the line and regulator would be equal to the capacitive reactance of the capacitors, and only the resistance of the circuit would limit the current. Calculations made on this feeder checked the test results.

Effects of Harmonic Currents

The effects of these harmonic currents flowing in the capacitors are twofold. The first effect is overload of the

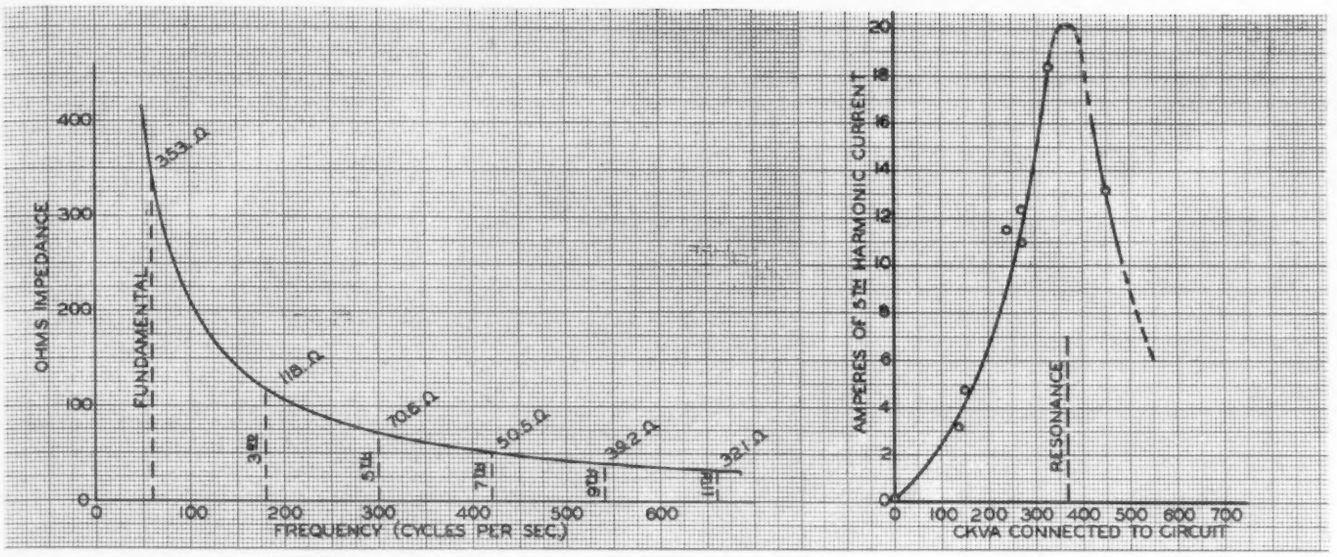


Fig. 2—Impedence of a 15-kva., 2,300-volt capacitor at different frequencies

Fig. 3—Resonance on 4-kv. feeder

capacitor itself. The harmonic currents flowing in the capacitors add to the fundamental current according to the route mean square law to give a total current higher than the fundamental current alone. The second effect is possible telephone interference that might be caused by the flow of harmonic currents in the power lines if sufficient exposure to telephone lines exists.

The effects of overload on the capacitors due to harmonic currents is not as serious as it might seem at first. Distribution capacitors are designed for a 35%-kva. overload capacity. The kva. of the capacitor is the sum of the kva. at 60 cycles and the kva. at the harmonic frequencies. Since the impedance of the capacitor at harmonic frequencies is less than that at the fundamental frequency, an appreciable harmonic current must flow before the harmonic kva., I^2X, becomes an important factor, and a capacitor with a 135%-kva. rating can carry a large harmonic current without danger of overloading.

Fig. 4 shows a curve which gives the allowable per cent of RMS (root mean square) current at various per cent RMS voltages. This curve shows the condition with only fundamental and fifth-harmonic currents present. It is seen that if the RMS voltage, that is, the root mean square sum of the fundamental and the fifth-harmonic voltages only, as assumed in this case, is 105%, the allowable RMS current, which is the sum of the fundamental and fifth-harmonic current, in this case would be 161%. At this RMS current value the fifth-harmonic component would be 125% of the fundamental current.

Harmonic currents flowing in the distribution lines to the capacitors may produce telephone interference by reason of the inductive coupling of the distribution lines and the telephone lines, if sufficient exposure exists and if care is not used in installing the capacitors.

The capacitors, as pointed out, will offer a low impedance path for the flow of harmonic currents and the flow of these currents from their source to the capacitors may be increased depending on the general circuit arrangement. If exposures exist in this area, care should be used in locating the capacitors in order to minimize telephone interference.

It should be pointed out here that the delta connection is used for capacitors on the 2,300- and 4,000-volt systems, so that no return path through the ground is furnished for the flow of the triple-frequency harmonic currents. The harmonic currents that can flow in the delta connection return through the lines. The fields of these harmonic currents appear between the three phases of the distribution lines, and the line transpositions are hence effective. To date, no telephone interference complaints involving capacitors have been reported on our system.

Origin of Harmonics

Harmonics on the distribution system originate from two sources. The first source of harmonics is the generators themselves. The harmonic voltages produced by the generators depend on the generator design. At this stage of the work on investigating harmonic currents in capacitors little is known of this source of harmonics, although it may be stated that the voltage waves of modern generators are fairly free from harmonics.

The second, and probably the chief, source of harmonic currents on the distribution system is the transformers on the system. The magnetizing current of a transformer contains approximately 100% fundamental, 40% third-harmonic, and 10% fifth-harmonic current. If the applied voltage of a transformer is raised 10% above the rated value the harmonic components of the magnetizing current will be increased by 50%, because of the shape of the saturation curve of the transformers.

Fig. 5 shows the harmonic analysis of the exciting current of a modern distribution transformer.

Fig. 6 shows the harmonic analysis of the exciting current of an old transformer rated at 110 volts on the secondary winding. It is to be noted here that when applied voltage is increased to 120 volts, which is now standard, the harmonic currents, as well as the RMS current, drawn by this transformer are nearly doubled. Thus, old transformers operated above their nameplate rating may be expected, in general, to draw excessive exciting currents, which in turn means that they will draw excessive harmonic currents.

Effect of Transformer

The effect of a transformer on the voltage wave shape can be explained as follows: The iron core of a transformer may be considered to act as a voltage frequency converter. The iron core will produce harmonic voltages due to the distortion of the flux wave which will in turn cause to flow the harmonic currents, which are needed to magnetize the core of the transformer. These harmonic currents will flow from one or two windings of the transformer through the most convenient return path, depending on the transformer design, connections, etc. These harmonic voltages will add to the applied voltage wave to cause distortion, and hence even if the applied voltage wave is a

perfect sine wave, it will be somewhat distorted when feeding a transformer, or other iron-cored device, such as a motor, reactor, etc.

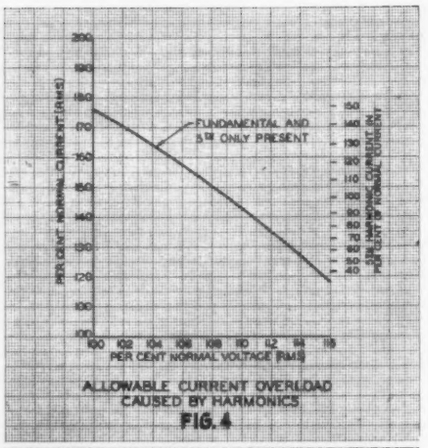
As pointed out above, transformers which are operated at a high magnetic saturation will require greater harmonic components in their magnetization current than will those operated at a lower saturation. The harmonic voltages necessary to produce these harmonic currents will be higher for transformers operated at a high magnetic saturation than for transformers operated at a lower magnetic saturation. Hence the greater the saturation at which transformers are operated the greater will be the distortion of the system voltage wave shape and it is seen that operating transformers at voltages above their nameplate rating will in general result in distortion of the system voltage wave shape.

It should be pointed out that capacitors, if connected close to a transformer bank, will furnish a low impedance path for the flow of these harmonic currents and may improve the voltage wave shape. This type of voltage wave-shape correction is most effective for the higher-frequency harmonics, since the impedance to the flow of the higher-frequency harmonic currents is lower. Care must be used in locating a large amount of capacitor kva. close to a transformer bank for experience has shown that a condition of harmonic resonance between the transformers and the capacitors is likely to be obtained at light load when the capacitor kva. is roughly from one-third to one-half that of the transformer.

The fifth harmonic is the one most commonly encountered in capacitor work since transformer connections are usually such as to allow the third-harmonic current to circulate in a delta-connected winding or to block its flow in the line.

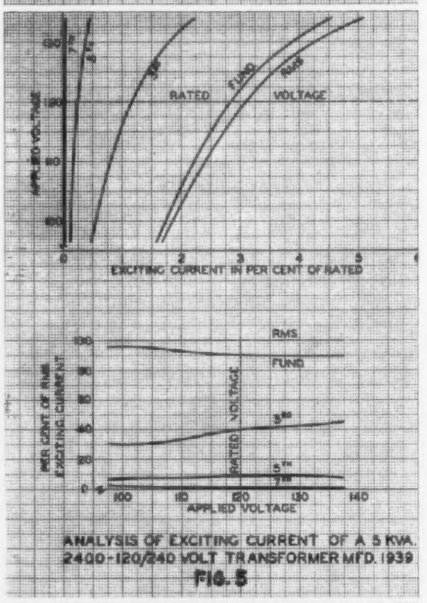
Actual tests at various locations show as high as 10% of fifth-harmonic in the voltage wave. However, such locations are the exception. In most locations tested, the fifth-harmonic voltage is something to the order of 2% to 4%. One other thing could be said about the fifth-harmonic current, and that is that the path of the fifth-harmonic current is confined to the three phases, just as for the 60-cycle current. However, it has reverse phase rotation to the 60-cycle component. The fifth and other non-triple frequency harmonic currents can flow equally well in a wye or delta connected capacitor bank just as can the 60-cycle current.

The path of the third harmonic and multiples of the third is through all three lines in phase to the neutral of the star connection, returning through



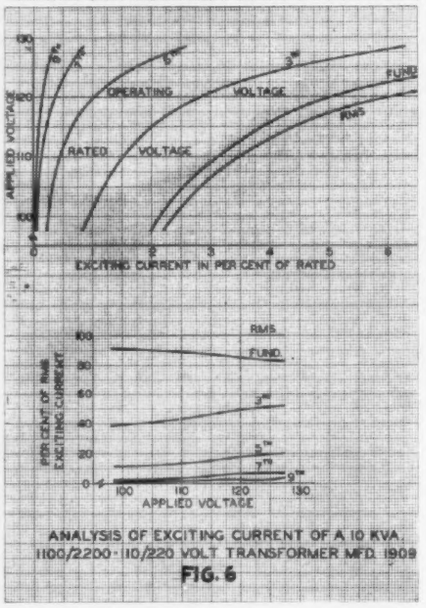
ALLOWABLE CURRENT OVERLOAD CAUSED BY HARMONICS

FIG. 4



ANALYSIS OF EXCITING CURRENT OF A 5 KVA. 2400-120/240 VOLT TRANSFORMER MFD. 1939

FIG. 5



ANALYSIS OF EXCITING CURRENT OF A 10 KVA. 1100/2200-110/220 VOLT TRANSFORMER MFD. 1909

FIG. 6

PCEA PAPER

This article was presented as an engineering paper before the 1940 meeting of the Operating Economics Section of the Pacific Coast Electrical Assn.

the ground. Thus a delta-connected capacitor bank would block the flow of the triple-harmonic currents, but it would have no effect on the flow of the fifth- and non-triple-harmonic currents.

Methods of Controlling Harmonics

Because of the price differential between the 6,900- and 12,000-volt capacitor, it is desirable to use 6,900-volt units connected in wye with the neutral grounded on the 12,000-volt system. As shown above, the grounded-wye capacitor bank offers a lower impedance to the flow of the third and other harmonic frequencies, and if there are appreciable triple-frequency harmonic voltages on the 12-kv. distribution lines, wye-connected capacitor banks will allow these harmonic currents to flow. This may cause serious telephone interference under certain conditions.

There are various methods of controlling the flow of harmonic currents so that they will not seriously affect the use of capacitors on the distribution system. The best method, of course, is to keep them off of the system in the first place. To do this, the overvoltaging of transformers should be avoided. Transformers that have a low voltage-rating should not be used at a higher voltage than the nameplate rating without investigating the effects of these transformers on harmonic currents and voltages.

Transformer banks should be provided with a delta-connected winding wherever possible by either connecting one of the main windings in delta or by providing a delta connected tertiary winding. The third-harmonic components needed in the magnetizing current of the transformers will circulate in the delta winding and will be kept off the lines.

Where long lines are involved between the capacitor installation and the substation transformer-bank, the resistance of the line tends to limit the flow of harmonic currents. High ground-resistance helps to reduce the flow of the triple-frequency harmonic currents in grounded-wye capacitor banks, as they must flow through the ground return path.

The character of the connected load has much to do with the harmonics on the line. Distribution lines supplying 3-phase transformer banks with delta-connected secondaries will, in general, have lower harmonic components in the line current because the delta connections of the transformer banks will furnish a low impedance path for the triple harmonic currents required in the magnetizing current of each transformer bank, and hence these harmonic currents will not have to flow in the lines.

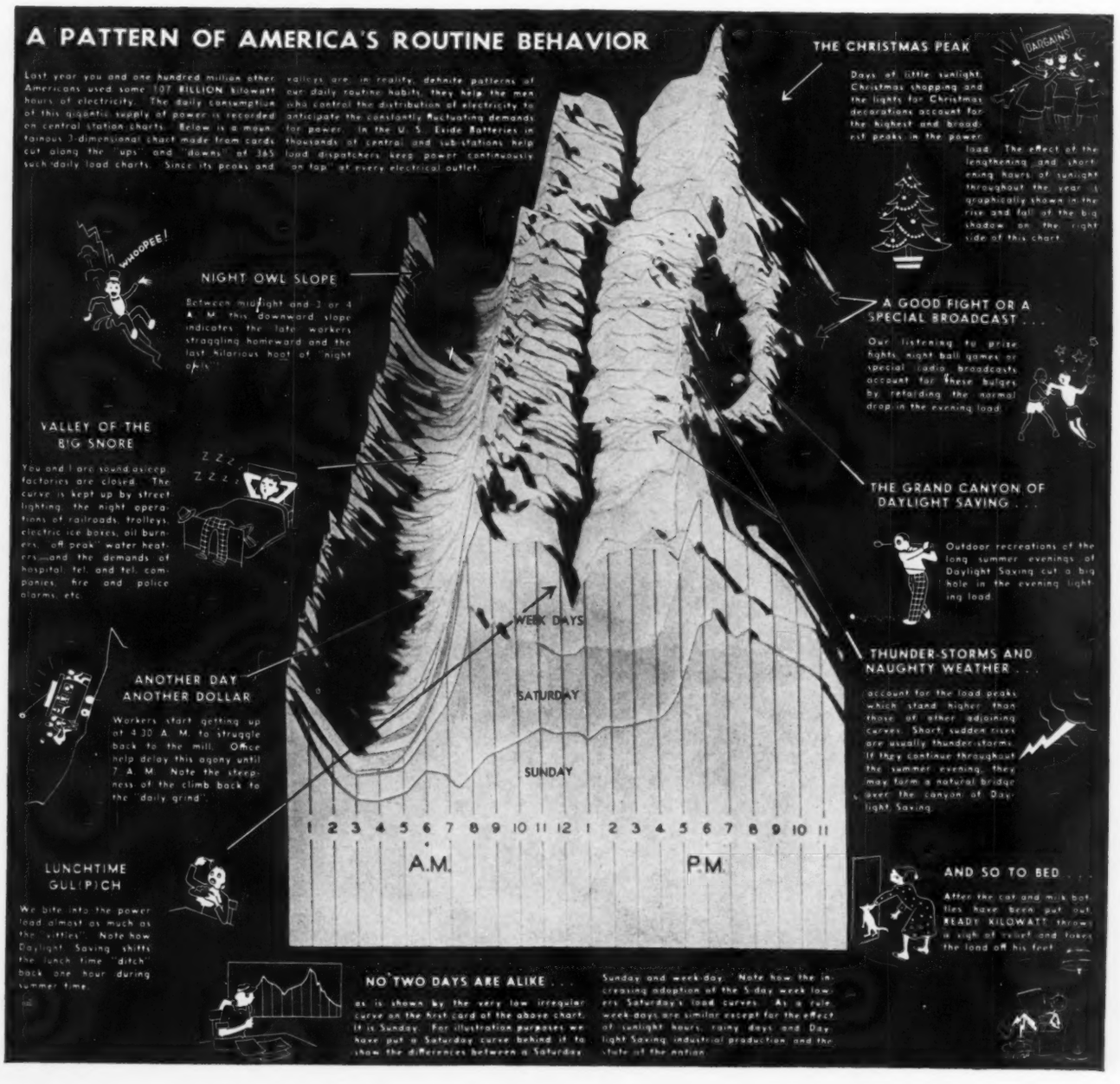
Special means to limit the harmonic current flowing in capacitor banks may

also be used. These may consist of impedors in the neutrals of wye-connected capacitor banks. In some cases, where resonance may be encountered, a small reactor may be inserted in series with the capacitor leads to upset the condition of resonance. However, careful attention will have to be given to the design of the reactors when this is done in order that the reactor and the capacitor bank will not resonate at some other harmonic frequency. Tuned traps may also be used at the source of the harmonic currents if a generator or some other large piece of apparatus is at fault. All these means, however, cost money and reduce the economic advantages of the capacitors. Hence, it is important to prevent harmonics from appearing on the system in the first place.

Harmonic currents in capacitor banks are not a serious problem in general but enough experience has been had with them to indicate that this problem must not be neglected if the fullest advantage is to be had from the use of capacitors on the system at the minimum of expense and trouble. Harmonic currents and voltages on the system can be controlled to a large extent by proper design and operation of the associated electrical equipment.

OUR WORK AND PLAY (IN KILOWATTS)

Here is an annual-daily, three-dimensional load chart with embellishments. Clever heads and a clever artist have taken this record of a large eastern system and given its ups and downs a very human meaning. It is published here by courtesy of The Electric Storage Battery Co.


A PATTERN OF AMERICA'S ROUTINE BEHAVIOR
Last year you and one hundred million other Americans used some 197 BILLION kilowatt hours of electricity. The daily consumption of this gigantic supply of power is recorded on central station charts. Below is a mountainous 3-dimensional chart made from cards cut along the "ups" and "downs" of 365 such daily load charts. Since its peaks and valleys are, in reality, definite patterns of our daily routine habits, they help the men who control the distribution of electricity to anticipate the constantly fluctuating demands for power. In the U. S. Exide Batteries in thousands of central and sub-stations help load dispatchers keep power continuously on tap at every electrical outlet.
THE CHRISTMAS PEAK
Days of little sunlight, Christmas shopping and the lights for Christmas decorations account for the highest and broadest peaks in the power load. The effect of the lengthening and shortening hours of sunlight throughout the year is graphically shown in the rise and fall of the big shadow on the right side of this chart.
BARGAINS
WHOOPEE!
NIGHT OWL SLOPE
Between midnight and 3 or 4 A. M. this downward slope indicates the late workers straggling homeward and the last hilarious hoot of "night owls."
A GOOD FIGHT OR A SPECIAL BROADCAST . . .
Our listening to prize fights, night ball games or special radio broadcasts account for these bulges by retarding the normal drop in the evening load.
VALLEY OF THE BIG SNORE
You and I are sound asleep, factories are closed. The curve is kept up by street lighting, the night operations of railroads, trolleys, electric ice boxes, oil burners, off peak water heaters—and the demands of hospital, tel. and tel. companies, fire and police alarms, etc.
Z Z Z
Z Z Z
THE GRAND CANYON OF DAYLIGHT SAVING . . .
Outdoor recreations of the long summer evenings of Daylight Saving cut a big hole in the evening lighting load.
WEEK DAYS
SATURDAY
SUNDAY
THUNDER-STORMS AND NAUGHTY WEATHER . . .
account for the load peaks which stand higher than those of other adjoining curves. Short, sudden rises are usually thunder-storms. If they continue throughout the summer evening, they may form a natural bridge over the canyon of Daylight Saving.
ANOTHER DAY ANOTHER DOLLAR
Workers start getting up at 4:30 A. M. to struggle back to the mill. Office help delay this agony until 7 A. M. Note the steepness of the climb back to the "daily grind."
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11
A.M.
P.M.
LUNCHTIME GUL(P)CH
We bite into the power load almost as much as the "kitties". Note how Daylight Saving shifts the lunch time "ditch" back one hour during summer time.
AND SO TO BED . . .
After the cat and milk bottles have been put out READY KILOWATT throws a sigh of relief and takes the load off his feet.
NO TWO DAYS ARE ALIKE . . .
as is shown by the very low irregular curve on the first card of the above chart. It is Sunday. For illustration purposes we have put a Saturday curve behind it to show the differences between a Saturday, Sunday and week-day. Note how the increasing adoption of the 5-day week lowers Saturday's load curves. As a rule, week-days are similar except for the effect of sunlight hours, rainy days and Daylight Saving, industrial production and the state of the nation.

Line Cost Cut

High crane speeds job

By CLAYTON M. ALLEN

Assistant General Construction Superintendent
Los Angeles Bureau of Power and Light

SAVINGS of more than 50% in the cost per ton of erecting level-country standard suspension towers for its third 287,500-volt electric power transmission line from Boulder Dam to Los Angeles are reported by the Los Angeles Bureau of Power & Light following anaylsis of costs of the recently constructed circuit and the first two similar circuits.

An important factor in effecting economies for this type of work was the use of a long boom crawler crane for complete erection of level-country towers as compared with the customary floating ginpole method.

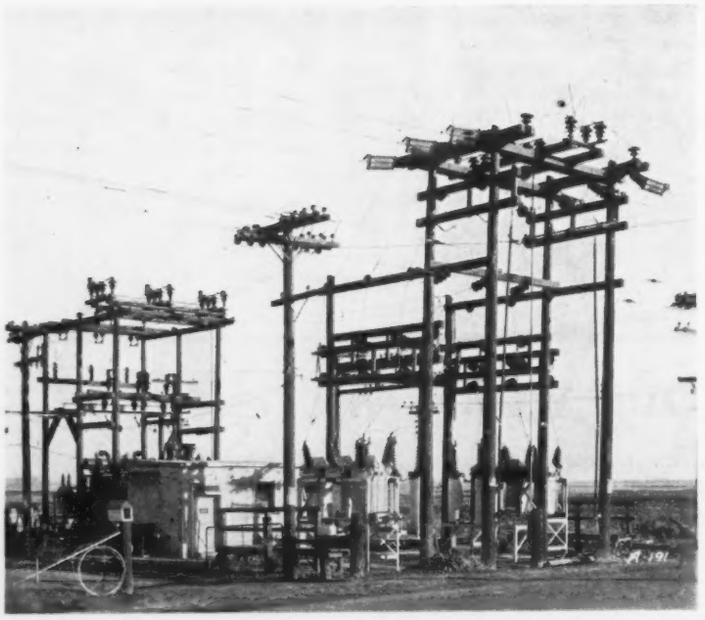
For the third circuit, 1,426 towers, with a total weight of 16,300 tons, and 3,210 tons of type HH hollow copper conductor were erected over the desert and mountain areas of California and Nevada lying between Los Angeles and the power plant at Boulder Dam.

Efficiency and speed of erection is indicated by the production schedule of three completed towers of the standard 90-ft. (to crossarm) suspension type towers in each shift. This was accomplished with use of a P. & H. 105-ft. boom, gasoline driven crawler crane (80-ft. plus 25-ft. jib boom) with crane operator, strawboss and tower crew of six high men and six ground men. Standard 100-ft. towers, measuring 120 feet from ground to tip of groundwire peak and weighing 24,000 lb., required slightly longer time.

Eleven separate lifts were made on the 90-ft. towers and 13 on the 100-ft. towers, the members having previously been assembled and bolted up on the ground by layout and boltup crews using a specially adapted truck-mounted derrick.

Construction of the 259-mi. circuit by the Bureau of Power & Light was completed, and the line in service May 2, 1940, in the record time of 10 months. It increases by 150,000 kw. the 240,000 kw. rated capacity of the first two circuits, which were placed in service in October, 1936. From that time to July 31 of this year the L. A. Bureau has paid the United States treasury $6,041,256 "falling water charge" for 4,533,173,333 kw.-hr. of energy.

The three transmission circuits were built under the direction of R. R. Robertson, engineer of construction for the Bureau.



The old 44/6.6-kv. substation looked like this. Low-voltage equipment was housed in the small concrete building which was overcrowded

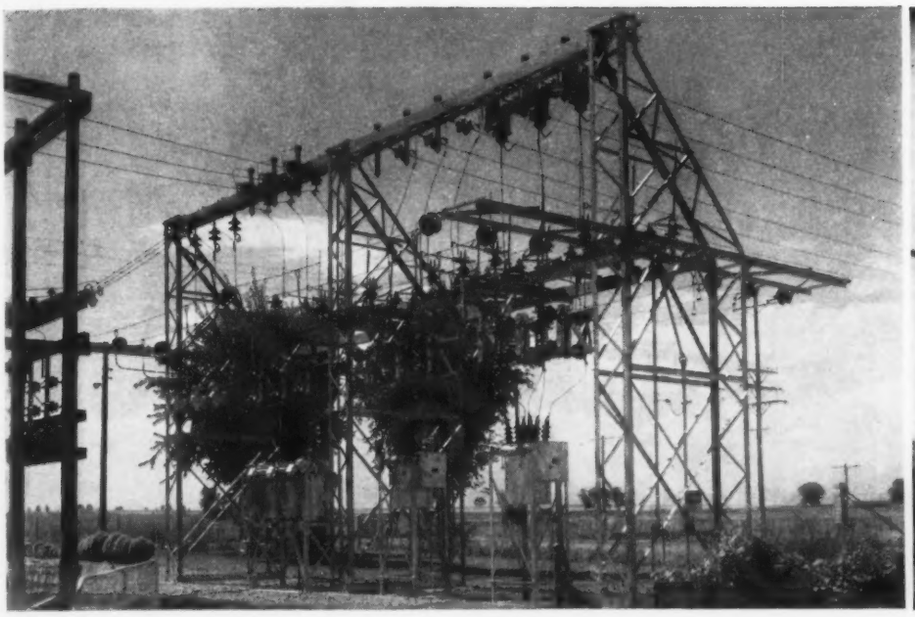
How Public Service of Colo-

Public Service Company of Colorado recently rebuilt its Puritan substation to obtain additional capacity at low cost with higher distribution feeder voltage and elimination of undesirable features such as operating hazards, congestion, unsafe arrangement, service interruptions and inadequate equipment. The new apparatus has high salvage value and possible re-use at other stations, together with interchangeability with other locations.

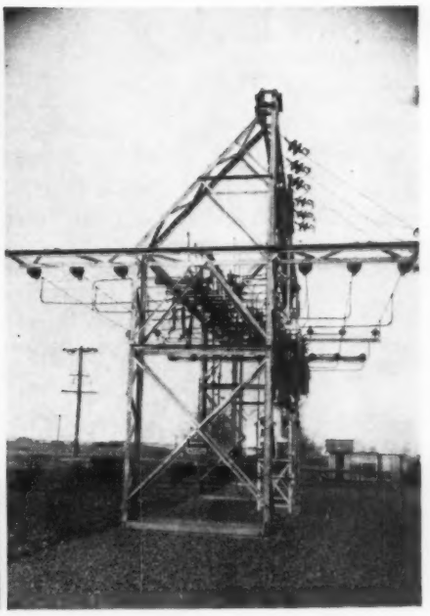
The substation is supplied at 44 kv. from two sides of a transmission loop through oil circuit breakers and disconnecting switches. The voltage was transformed to 6,600 volts for distribution in a coal mining area, and the low-voltage bus, switchboard and manually-operated oil circuit breakers were located in a small concrete building which also included panels and relays for control of the 44-kv. circuit breakers. The electrical arrangement in the building consisted of a single bus with no disconnecting switches for the oil circuit breakers and no by-pass facilities for the inspection and maintenance of 6,600-volt equipment. It was also very congested in the building, and the oil circuit breakers were old and of inadequate interrupting cacapity, thus creating a distinct fire hazard. The increase in load indicated that transformer capacity would not be large enough to meet the requirements of the area and replacement would be necessary. This would result in heavier short circuits and the combination of increased load on the breakers and greater interrupting duty would increase the possibility of breaker failure. It was also found to be desirable to connect the 6,600-volt system in wye with grounded neutral to give 12 kv., which would help solve some voltage regulation problems in the distribution system. This change could not be made on the old indoor portion of the station.

Studies indicated that an outdoor design would correct the unsatisfactory features of the old substation and accomplish the desired results at a low cost. A simple, inexpensive steel structure was designed to carry the 12-kv. bus, disconnecting switches and lightning arresters and would not take up much space. It could be located adjacent to the old building and would not require the purchase of additional land. It was also possible to build the structure complete and then cut over to it thus eliminating outages.

The arrangement is quite simple and operating errors should be reduced to a minimum. Also, additions to the structure can be made easily when more feeders are required. It also provides ample clearances and a main and transfer bus has been included together with



Conversion to 12 kv. Y solved some voltage regulation problems. A simple, inexpensive steel structure was designed to carry the 12-kv. bus, disconnecting switches and lightning arresters



This end view emphasizes the simple arrangement — which provides for future additions

rado Designed a Small Sub

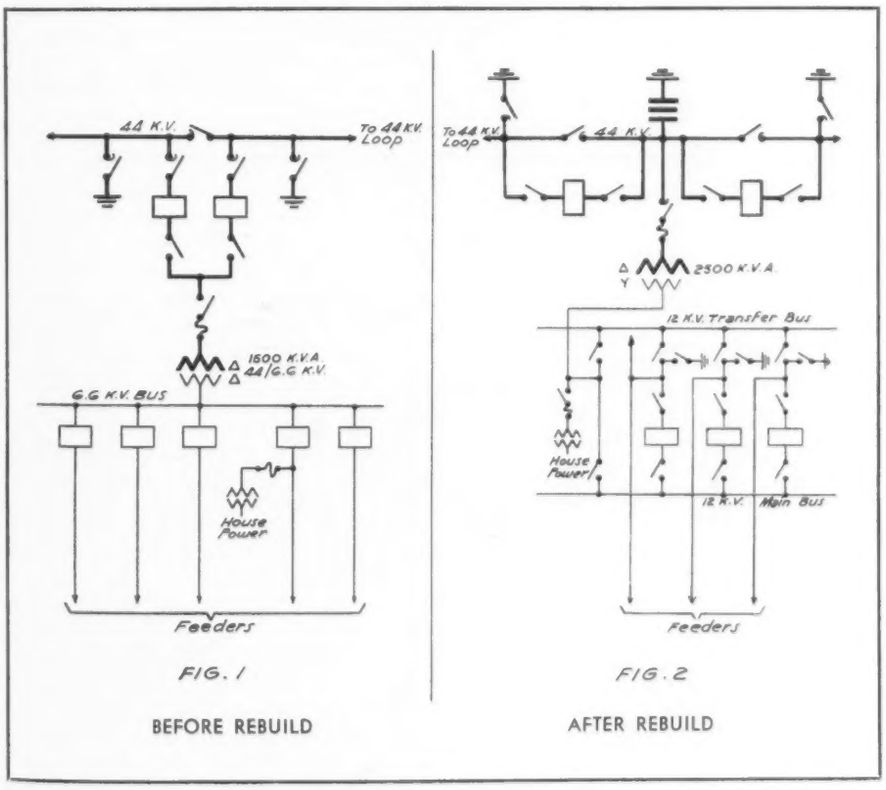
By L. M. Robertson
PS Co. of Colorado

necessary disconnecting switches, so that proper inspection and maintenance work can be done. An oil circuit breaker was available from a substation in Denver where it had been replaced because of inadequate capacity, but was satisfactory for Puritan substation, therefore, the job only included the purchase of two additional circuit breakers.

After the old equipment was removed from the building, panels were added indoors to carry meters and relays for the 12-kv. circuits and automatic reclosing relays were added to give instantaneous first shot reclosing with subsequent delayed reclosures to improve service to customers and eliminate the need of calling the local representative to the substation except in case of permanent trouble. This eliminates the long delays involved in getting service restored in case of feeder trip out, since in most cases the trouble was only transitory.

The 44-kv. and transformer structures were rebuilt at the same time and transformer sizes increased by moving in a bank from another location where the load had exceeded its capacity. The 44-kv. relays and controls were retained on panels in the building.

By the installation of outdoor equipment, the old, obsolete, inadequate breakers were removed, thus eliminating hazards to service and men and obtaining outdoor apparatus of a high salvage value and interchangeability with other stations at a low cost. Service has been improved, distribution voltage increased and maintenance work facilitated. Capacity has been increased and future additions can be made easily and at low cost.



Urban Unit

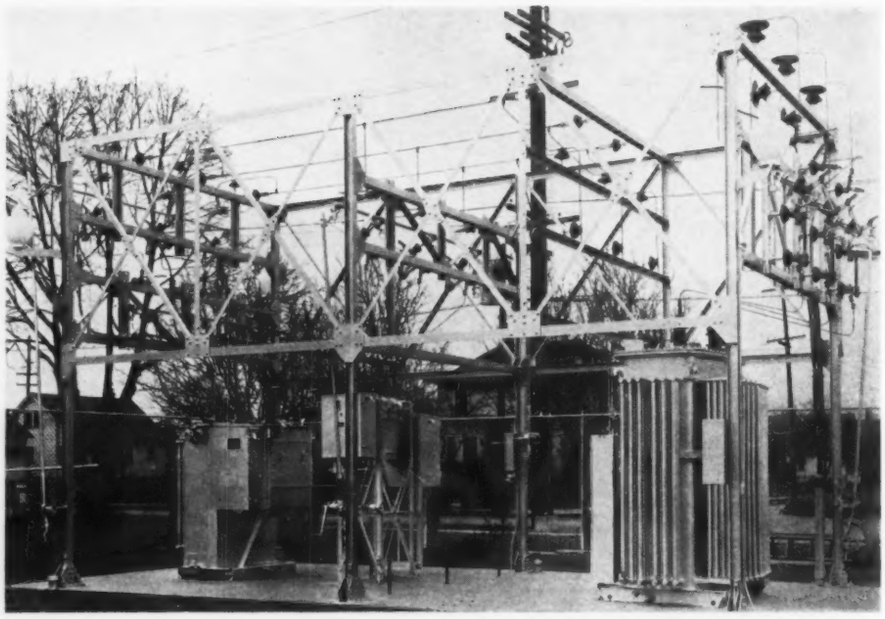
Portland GE builds three similar substations

For serving urban distribution in the city of Portland, Portland General Electric Co. recently installed three single-unit substations, one of which is illustrated here. It is typical of the three in regard to arrangement, equipment, and steelwork, which was largely fabricated in the company's own shops.

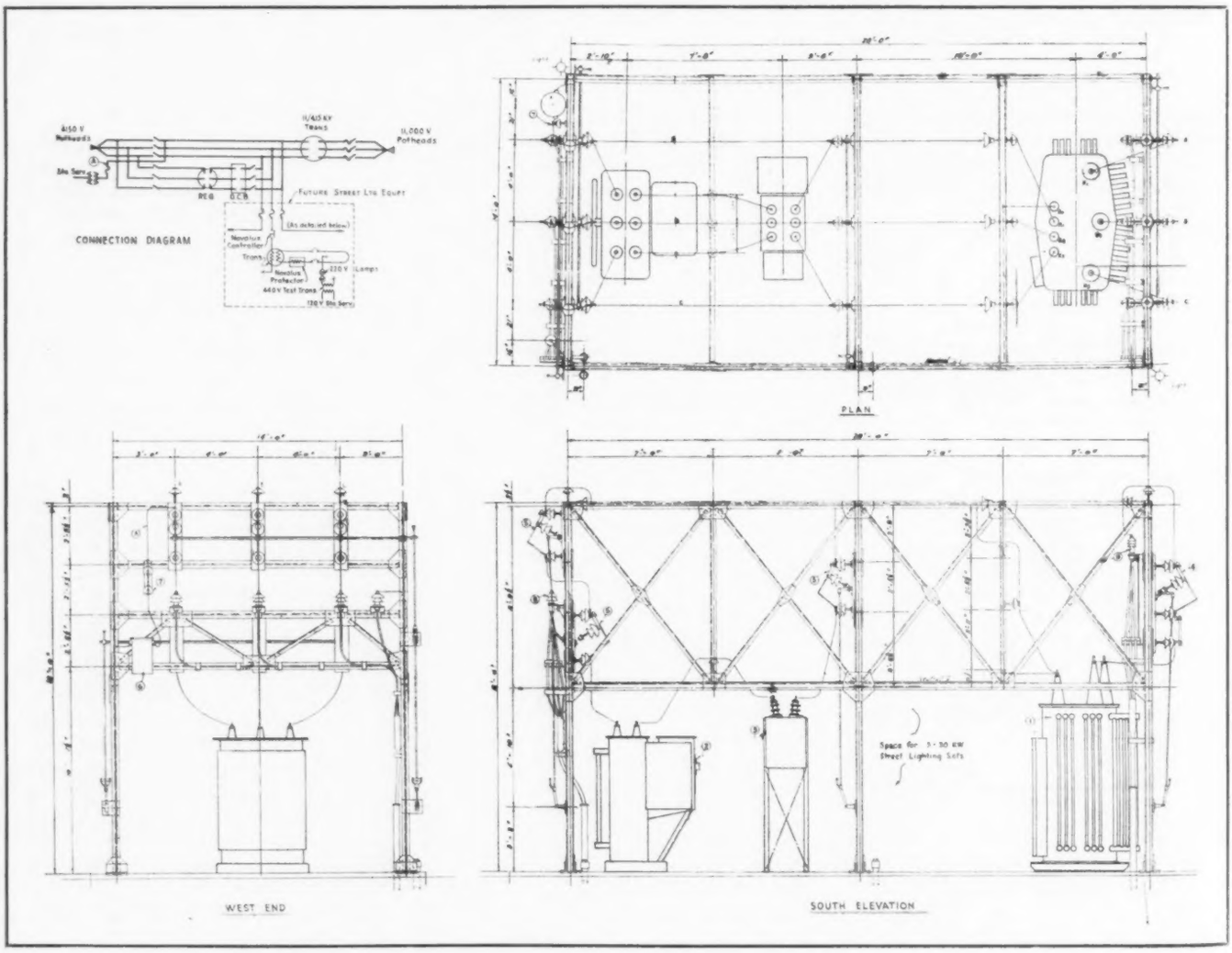
Each station has a 3-phase, 1,500-kva. transformer with four 2.5 full-capacity voltage-reduction taps in the high tension winding. The regulator is 3-phase, 144-kva., 4,150-volt, step-type, with 10% plus or minus regulation.

Disconnects are included for cutting out and by-passing the regulator and reclosing equipment. This latter consists of a 7.5-kv., 50,000-kva.-interrupting-capacity oil circuit breaker. Relay and metering equipment are contained in a cabinet mounted on the breaker.

In each station is provided space for installation of three 30-kw. street-lighting transformers. These will be connected ahead of the regulator on the low-tension side of the transformer.



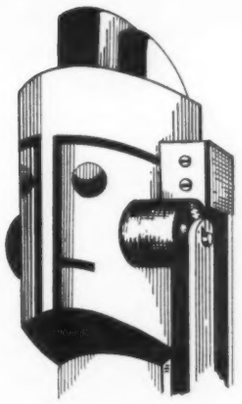
Incoming 11-kv. supply, and outgoing 4,150-volt feeder are installed in underground lead-covered cable.



ABC's of Relays

Part 4—How the impedance relay started

By E. B. KIPP
Westinghouse E & M Co., Los Angeles



SIMPLE overcurrent and directional relays set on a current and time basis to secure selective operation usually provide adequate protection where the electrical system is not too complicated.

On large transmission systems the number of relays necessary for proper protection is so large that a simple timing sequence can no longer be used for proper discrimination. It was this need which led to the development of the impedance or "distance-measuring" relay.

Faults on a transmission line show these symptoms: excess current and low voltage. Short-circuits near the generator end of a line cause a heavy flow of current and a big dip in voltage while those some distance away have less effect on either current or voltage.

This is illustrated graphically in Fig. 1, which shows a theoretical transmission line (with substations A, B and C) and the voltage gradient along the line resulting from a fault at some point X. The actual slope of the voltage gradient curve, of course, depends upon individual transmission-line characteristics.

A simple explanation of the effect noted is that the impedance (resistance and reactance) of the line up to the point of fault tends to limit the short-circuit current and reduces the voltage dip proportionately. From this, the general statement may be made that the greater the distance to the fault the less the reduction in voltage at the generator end.

It was upon this basic principle that the first impedance relay was designed.

Essentially the original impedance consisted of two parts—a current element and a voltage element, separate electrically, but connected mechanically through a spring (Fig. 2). The current element was similar to that of the induction-disc over-current relay except that the disc did not close the trip contacts directly but wound up a spiral spring. The spring in turn transmitted its torque to the contact arm which tended to close the trip contacts. The voltage element consisted of a solenoid coil with a plunger. The pull of the coil on the plunger through a mechanical linkage tended to keep the trip contacts open.

When in the neutral position all parts of the relay were balanced so with no voltage on the voltage element, a slight movement of the disc would close the contacts. When the voltage coil was energized, its pull would keep the contacts from closing until the spring had been tightened sufficiently to overcome the pull.

Since the torque generated in the disc varied almost directly with the current, the time required to close the trip contacts (with a given voltage applied to the voltage coil) varied inversely as the current flowing. Or, the greater the current the shorter the operating time.

Likewise, because of the specially-shaped plunger of non-residual steel, the pull exerted upon it by the voltage coil varied directly with the voltage. Thus, with a constant current, the time required for operation varied directly as the voltage.

Hence, considering the effect of current and voltage together:

$$\text{Operating Time} = \frac{\text{Voltage}}{\text{Current}}$$

$$\text{but } \frac{\text{Voltage}}{\text{Current}} = \text{Impedance}$$

and, therefore, the operating time varied directly as the impedance or distance to the fault.

Considering again the conditions illustrated in Fig. 1, if induction-disc over-current relays were installed at substations A, B and C, the operating time-settings of the relays would perhaps be A = 0.1 sec; B = 0.6 sec. and C = 1.1 sec. in order to insure tripping of the relay nearest the fault. With impedance relays, however, no such restrictions are imposed, since the operating time of each relay for any given condition depends solely upon its distance to the fault. Thus, the complications resulting from pyramided time sequences are eliminated entirely and faults can be cleared immediately with proper discrimination.

Where directional control is necessary the impedance relay can be used in conjunction with an induction-disc directional relay element to great advantage in place of the ordinary directional over-current relay or ring.

All of the relays discussed thus far in this series have been of the so-called slow-speed type which in some cases have operating times running up to several seconds. Originally a time delay in operation was not objectionable. Sometimes it was even desirable, because it decreased the strain upon the circuit breaker by allowing the short-circuit current to drop to its steady state value. The major objection to this scheme of operation was that a minor fault which was not cleared promptly could spread into a major disturbance by making the system unstable and allowing generating stations to fall out of step with each other.

System stability studies made during recent years indicate that the most effective method of decreasing system disturbances is to isolate the faulty sections just as quickly as possible. Modern high-speed high-interrupting capacity circuit breakers and high-speed relays are capable of locating and clearing faults in 0.15 sec. or less and have done much towards increasing continuity of service. Relays which can accurately locate and determine the nature of a fault and energize a circuit-breaker trip coil, all in the space of 0.03 sec. or less, are truly remarkable.

Some of the more important high-speed relays will be discussed in an early issue.

Fig. 1—Theoretical transmission

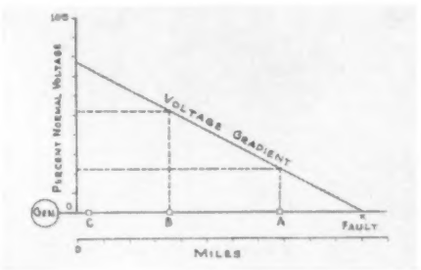
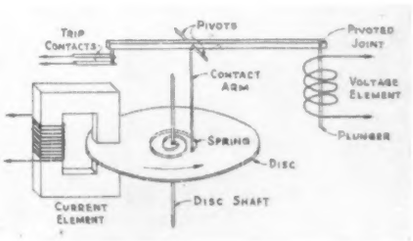


Fig. 2—Impedance principle



NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 36

SUBJECT ..... STEREOTYPE POT
CUSTOMER ..... IDAHO FREE PRESS, NAMPA, IDAHO
TYPE OF BUSINESS ..... DAILY NEWSPAPER
SIZE OF BUSINESS ..... (CIRCULATION) 4,000
SERVICE COMPANY .....IDAHO POWER

Prepared by E. E. Haroldsen
For the Commercial Heating Section

This equipment is used for stereotype and casting pigs for linotype in a newspaper plant using a flat-bed press. It replaces a coal-fired pot of 1,500-lb. capacity.

Embodying the equipment listed in the table, the installation is so connected that whenever the 15-hp. press motor is turned on, the lead pot is automatically turned off. Electrical equipment was installed in the pot which was previously coal fired and permitted its being moved from the basement to the main floor.

Production amounts to 1,500 lb. of type metal at 650°F. per day, six days per week. A measured electrical consumption of $10 worth of energy compares with a previous cost of $12.50 for coal and $4 for firing.

In addition to this, the more efficient arrangement of the plant made possible by the electric pot resulted in an estimated $15 per month saving in labor and $5 saving in burned metal.

Through uniform temperature of the metal, clearer, more uniform cuts are now possible. Absence of dirt and smoke has improved working conditions. The management states that the improvement has resulted in a 20c-per-page reduction of mechanical costs. Since the minimum issue is eight pages, this amounts to a minimum saving of $48 per month.

THE IDAHO FREE PRESS
Bernard Mainwaring, Editor
Nampa, Idaho

Mr. Earl Haroldsen,
Commercial Representative,
Idaho Power Company,
City.

Dear Mr. Haroldsen:

I know you will be interested in our experience with the electric melting furnace you helped us install nearly two months ago.

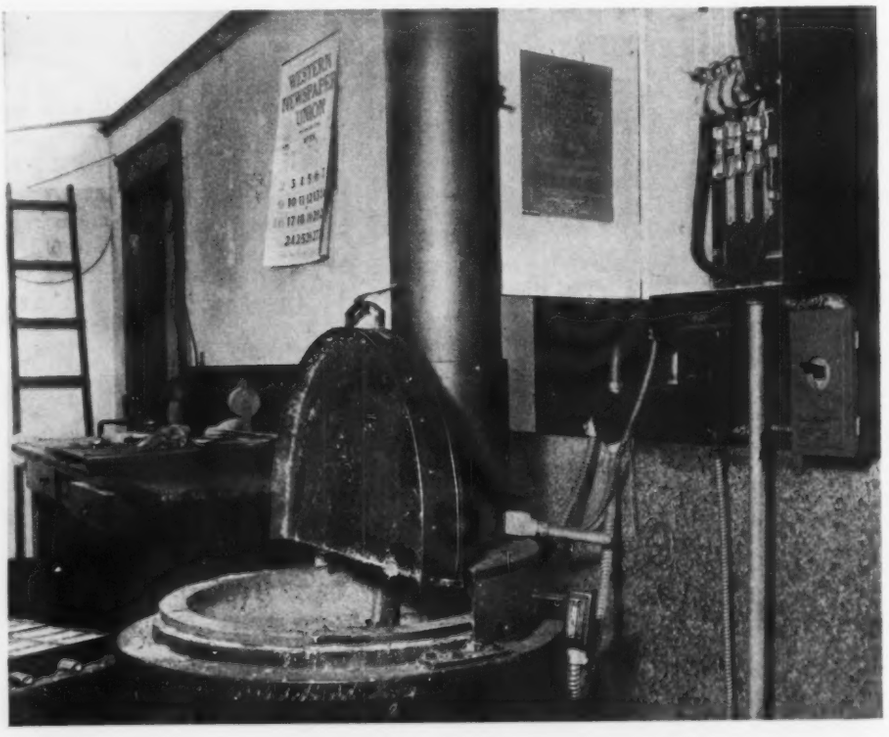
As to cost, it appears that there will be a saving of a few dollars a month over the coal method we were using before. The electric cost will not exceed $10 a month and may be a little less. The cost of coal was at least $12.50.

There is a saving in labor in the stereotyping operations. Our accountant tells me our page costs will be reduced by 20 cents, which is a very substantial saving over a year. There is a further saving, difficult to estimate but sure to be quite substantial, in metal, as we now control the temperature and prevent overheating, which we were unable to do before.

As to cleanliness and convenience there is of course no comparison. I now wonder how we got along with the old heating arrangement, operated in the basement where lights had to be burned continuously, where working conditions were not good and where we were put to the expense of moving the metal back and forth between the basement and our composing room.

Altogether it was a mighty good piece of work, which increased our use of electric current and at the same time effected a nice economy for us, besides making things more pleasant for our workmen. Congratulations.

Very truly yours,
(Signed) Bernard Mainwaring
Publisher, The Free Press



Equipment Installed

2—5-kw., G-E, 29x741, cast-in type heating elements, connected 3-phase open delta.
1—Control panel, G-E No. CR2604-H2.
1—Thermostat, G-E No. CR2992-R1, non-indicating.
1—Temperature-limiting device, G-E No. CR2992-R15
1—Relay, G-E No. CR2811-C1U.

Cost of Equipment

Elements and control equipments	$217.20
Wiring	48.45
Machine work	10.18
Insulation, Johns-Manville "filinsul"	19.16
Sheet metal, metal floor, smoke pipe, insulated lid	55.50
Total	$350.49

THE PACIFIC COAST ELECTRICAL ASSOCIATION

Industrial Data Sheet No. 5

SUBJECT.....ELECTRIC STEAM BOILER
TYPE OF WORK.....SAUSAGE COOKING AND DRYING
PLANT..SWISS AMERICAN SAUSAGE CO., SAN FRANCISCO
SERVICE COMPANY.....PACIFIC GAS AND ELECTRIC

Prepared by J. H. Hedge
Pacific Gas and Electric Co.

The process involves cooking and drying sausage and salami and sterilizing the equipment. The cooker uses 15-lb. steam, and cooking may be by: (1) water bath thermostatically controlled at 160°; (2) live steam; (3) dry air heated by steam coils in the bottom of the cooker. The drying room is heated by a steam coil laid about 12-in. above the floor, and room temperature is thermostatically controlled at 80°.

Equipment

The steam is furnished from a Northel Iron Horse boiler, supplied by North Bay Electric Works, Inc., San Rafael. The boiler operates at 15 lb. per sq. in., holds about 7 gal. of water, which is fed automatically. It is model 40AF. Three 5-kw., G-E Calrod immersion heating elements are used.

The boiler, electric immersion heaters, thermostats, wiring and piping cost about $350 installed, exclusive of the cost of the cooker.

Operation

Sausage is cooked as outlined above. The cooker has a capacity of 600 lb. every 2½ hours. Sausage is then taken to the drying room where it is held at 80°. After drying it is hung on racks in a curing room.

At present, with production at 10,000 lb. per month, 1,870 kw.-hr. are used at a cost of slightly less than $30, or three mills per pound of sausage. In addition to the heaters, power equipment includes grinders, pumps and refrigeration, amounting to 10 h.p. The 1,870 kw.-hr. excludes lighting.

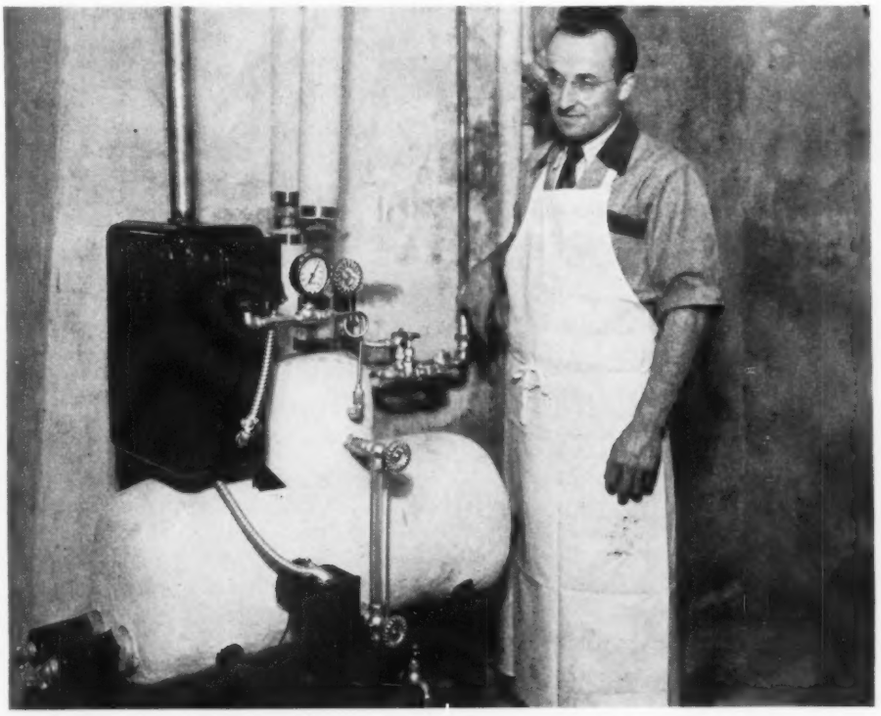
Realized Advantages

(1) Simplified cooking and drying; thermostatic control gives satisfactory results and uniformity of product; (2) time and labor savings through automatic operation.

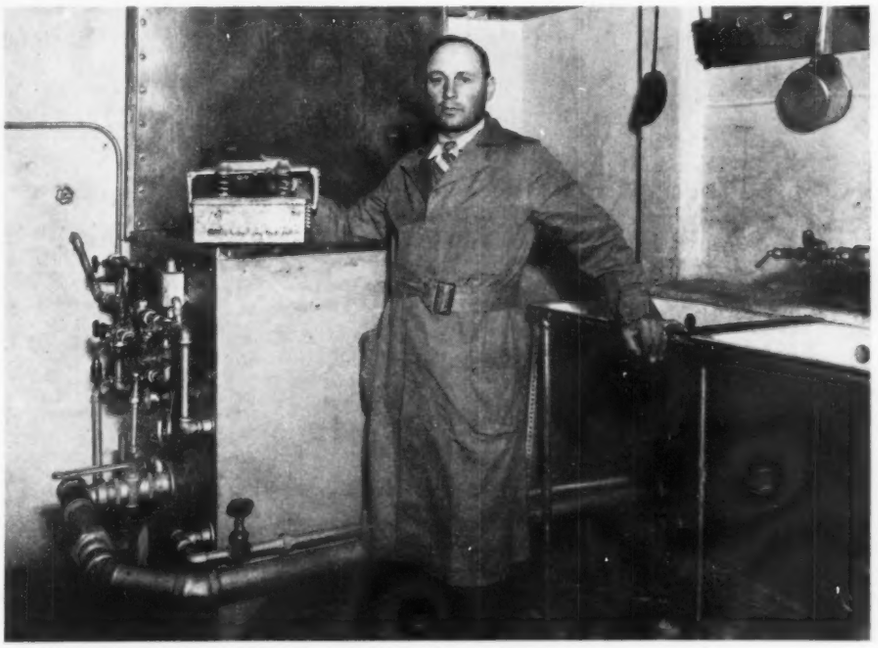
Customer Reaction

The customer states that he is perfectly satisfied with the electric cooking installation, especially as regards its cleanliness, ease of operation and positive control, time saving and power cost, which, he says, is less than he anticipated. Furthermore, the system has the complete approval of the Public Health Department.

Charles Rosselli beside the steam generator. Two 5-kw. immersion heaters at left, one at right end of the boiler. The pressure switch, indicator and glass and switch box are above

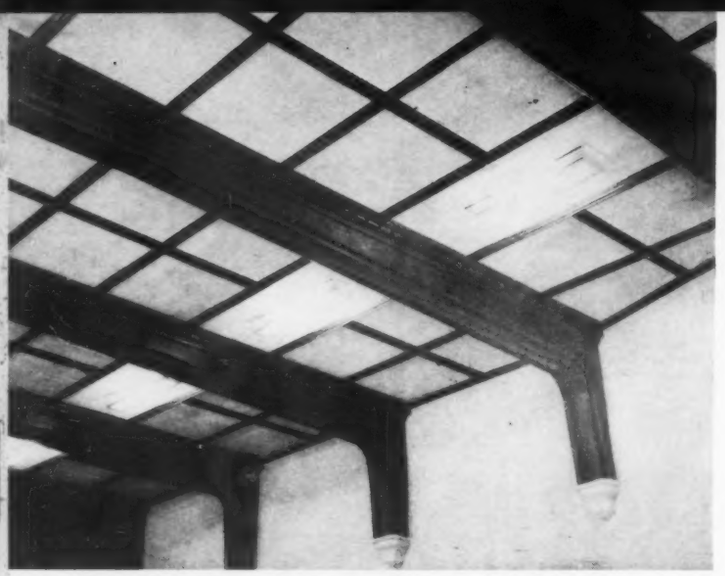


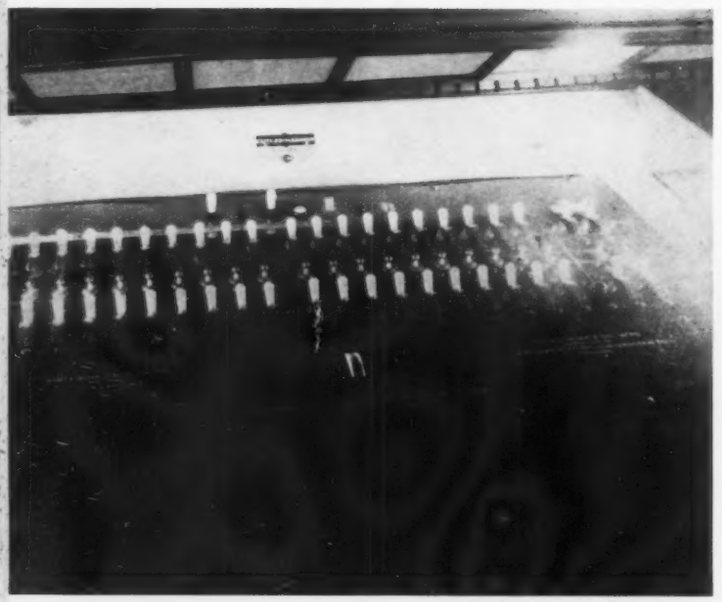
Six-hundred-pound cooker. Steam and water connections and valves and controls can be seen at the left. August Foglia holds the container in which pressed ham loaves are cooked.



"Double Feature" for S

***Santa Rosa Junior College** aud**r** **control lighting system combi**ng*





Two special and extraordinary attributes of the new Santa Rosa Junior College auditorium are its combined lighting and ventilating ceiling fixture, shown above, and the remote control stage lighting control panel operating from rear of the balcony, illustrated at left

BOTH a remote control stage lighting control console operated from the balcony of the auditorium and an unusually effective ceiling lighting fixture that conceals air-conditioning vents are new features of the auditorium lighting in the recently dedicated Junior College at Santa Rosa, Calif. In the latter, interest lies in the way that lighting efficiency has been secured with an absence of glare, together with an effective louvering of the incoming air.

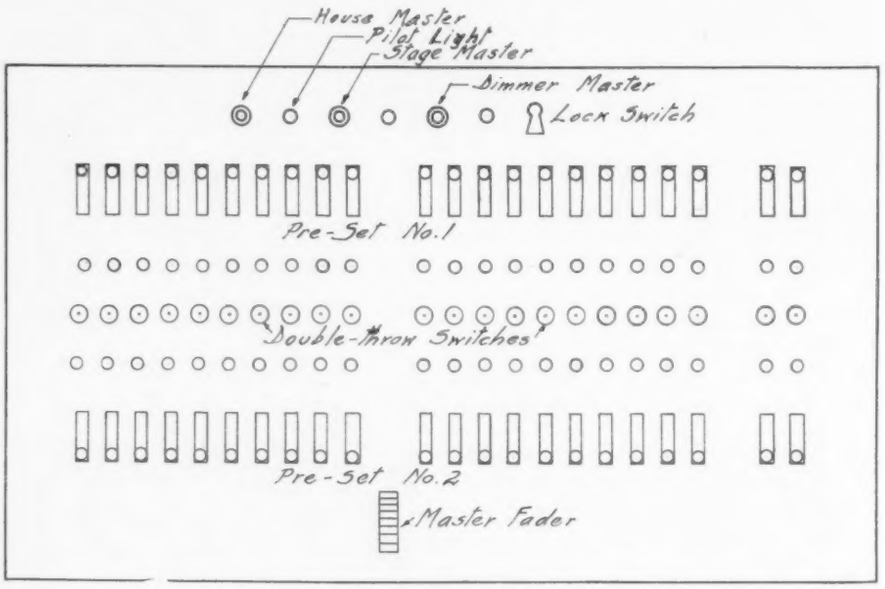
The fixture itself is built up by the use of three Holophane optical units, each with a 12-in. controlens under the lamp, combined in a louvered lighting-and-ventilating fixture approximately 7 ft. long and 18 in. wide. The Holophane units themselves are housed in a can within the duct and dropped to approximately 8 in. below the ceiling light.

The glass bottom of the fixture extends on each side beyond the optical units themselves to cover that portion of the ventilating duct otherwise exposed to view. At the same time, light leakage from the reflector illuminates this extended portion so that the light tapers off from the full brilliance of the controlens to the partial brightness at the ends. Light also emanates from the louvered members of the fixture toward the ceiling, with the result that the entire ceiling is illuminated to very near the same intensity as the side walls. Cornice shadows, at the same time, are practically eliminated.

In fact, the entire lighting effect in the auditorium is that of complete illumination with maximum intensity at the working plane. Because of this completeness of illumination, the element of glare so hard to overcome in direct lighting schemes is avoided. The casual observer will probably not even notice the light sources in the room.

Air-conditioning vents are so combined with the lighting fixtures and the architectural detail of the auditorium that their combined effect is more easily enjoyed than directly observed. The ventilating ducts themselves—often so unsightly—are entirely covered by the lighting fixture, making the latter functionally decorative rather than obviously utilitarian as is so often the case. This happy result is a concrete illustration of effective collaboration between architect and lighting fixture manufac-

Diagram of the arrangement of presets and remote control dimmers. A scene is set up on one set, and by automatic throw-over can be switched into or faded into the second preset arrangement by the operator at will



PRINT IN BINDING

...lor School Plays

...audi...rium has newest remote ...ombi...g light and ventilation

turer, the architect, C. A. Caulkins, of Santa Rosa, having worked out the problem in advance with Douglas Kerr of the Roberts Mfg. Co., San Francisco. A total of eight of these fixtures makes up the entire lighting scheme of the auditorium. Electrical contractor was American Electric Co., San Francisco.

Stage Lighting Control

These previously mentioned eight ceiling fixtures constitute the "house lighting" of the auditorium. The stage lighting consists of the usual footlights, a proscenius bridge, border lights, six proscenium lights imbedded in the auditorium beams, and stage pockets.

Instead of the conventional dimmer switchboard in the wings of the stage, the auditorium is provided with a Cutler-Hammer major Modulite Varilux control system, the "brain" of which is the console located on a balcony at the rear of the auditorium, in full view of the stage. Here the dramatic director may sit during rehearsals and produce at will such lighting effects as he may desire, playing on the console as on a color-organ.

This remote-control system is so far the only one of its kind west of Chicago. In it master-switches are so arranged as to control any combination of individual switches. By this means, once a combination of color-intensities in the various circuits has been predetermined, the composite effect can be instantaneously reproduced by the simple pressure of a switch, or, if preferred, the desired lighting effect can be brought up gradually by means of the dimmers. In addition, the lighting of one scene can be smoothly "faded" into the lighting of the scene following.

The Console in Detail

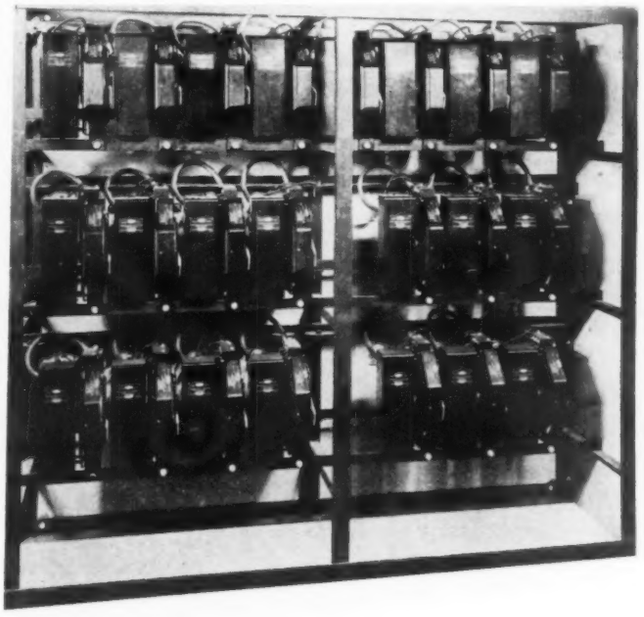
The entire set of switches, each one controlling an individual circuit on the stage or in the house, is shown in the row marked "Pre-set No. 1" in the diagram. Each switch handle is connected to a rheostat located behind the control-board, operating its appropriate dimmer by remote-control. By means of this one row of switches, all the lights in the house or on the stage can be controlled. But during the enactment of a scene the lights for the next scene can be pre-set at leisure, to be ready whenever needed. This is done by means of the second row of switches, marked "Pre-set No. 2." But after all the switches in the lower row have been arranged in accordance with the requirements for Scene 2, the lighting-effect for that scene can be secured by operating the master fader, which gradually fades the stage lighting from that being used in Scene 1 to that desired for Scene 2.

A row of double-throw switches determines whether it is the upper row of dimmer-switches or the lower row which is "alive," and pilot-lights at the same time provide the necessary visual indication. A lock-switch in addition makes it possible to lock up the control-board after any setting has been arranged (for instance, at the end of a rehearsal), making it impossible to disturb this setting until the lock-switch has been unlocked again—a precautionary device that has obvious advantages.

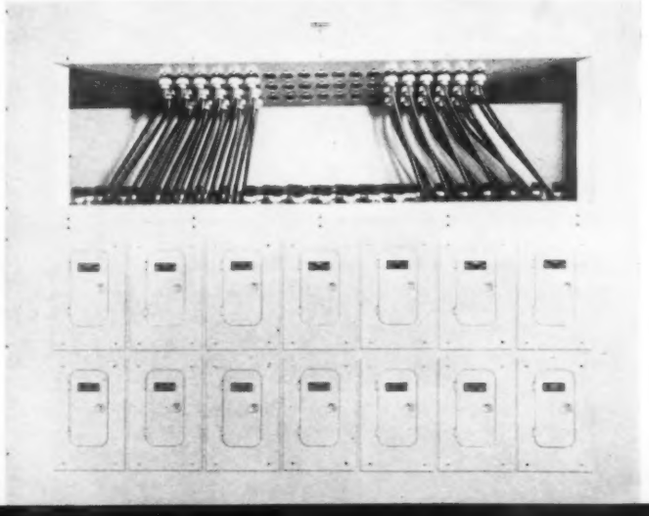
Dimmer Board Details

The dimmer board that is actuated by the above console is situated outside the auditorium proper, and as has been stated, is operated by remote-control. The board is of the dead front type, and connections to the various circuits are made by means of plugs and sockets similar to those in a telephone switchboard. The plugs themselves are connected to the dimmers, while the sockets are connected to the stage or the house circuits. An extremely flexible arrangement is thus secured, since any desired circuit can be connected to any dimmer (and therefore to any dimmer-switch on the console) by simply plugging in the appropriate socket with the correct plug.

From the rear view of this dimmer board it may be seen that, each unit consists of an auto-transformer type dimmer and its actuating motor, the latter being of the shaded pole type. The control of these motors, again, is of the responding potentiometer and balanced relay type. Each dimmer-switch on the console is in effect a potentiometer, and when this is actuated, the dimmer-motor commences to turn over until the potentiometer is balanced again, corresponding to the position chosen on the dimmer-switch dial.



Auto-transformer type dimmers and actuating motors are set up at the rear of the plugboard shown below. These are operated remotely through potentiometers and balanced relays



Selection of whatever borderlight, footlight or stage pocket circuits are wanted for a stage production is made through this plugboard which backs the dimmer panel and is connected to it

A Community At Christmas

Casper, Wyo. Association outlines outdoor Christmas lighting contest and discloses present 1940 plans

RESPONSIBLE for the Christmas display pictured on our cover this month was the Casper, Wyo., Electrical Contractors' Assn. It was the heart of a successful Christmas lighting program for the city of Casper. Something of the same kind will be done this year, according to Mark F. Rowley, its president.

Affiliated with the Rocky Mountain Electrical League, the Casper Electrical Contracts' Assn. had the support of Casper Supply Co., Mountain States Power Co., General Electric Supply Corp. of Billings, Mont., and the Mine and Smelter Supply Co. of Denver.

Of the details, which may serve as a guide for similar activities in other communities, Rowley writes:

"We created three brackets in which the contestants were to participate. The first bracket was for business houses of four or less rooms; second bracket consisted of houses for five or six rooms, and the third bracket for houses of seven or more rooms. A first and second prize was given for each bracket, the prizes being identically the same.

"Prizes consisted of hand-engraved trophies on which was engraved the winner's name. We also gave a trophy as a grand prize for outdoor lighting to merchants and other business houses. Judging was done by five disinterested parties selected for their ability to pass on outstanding features of the displays from different viewpoints. For instance, one judge was charged with determining the effectiveness of lighting only, another was charged with judging the selection of locations for the display, another to pass on the artistic arrangement, another for originality, and the last for determining whether the display conformed to the Christmas spirit.

"Contestants were notified that the judging would be done some time between Christmas and New Year's. This made it necessary to keep the displays lighted every night during the Christmas holidays. Winners were notified on New Year's day and trophies were presented as quickly thereafter as the engraving could be completed.

"In order to help stimulate interest in the Christmas outdoor lighting, our Association hit on the plan of presenting a display of our own which would serve a two-fold purpose. One was to help stimulate the Christmas spirit in advance. In order to do this, we unveiled our display the first week in December. Our theory in presenting it so early was to warn Christmas shoppers that the Yuletide Season was at hand. The second purpose of the display was to give contestants an idea of possibilities for their own displays. The success of our last year's campaign really exceeded all of our expectations as a result.

"This year the merchant's committee of our local Chamber of Commerce, because of our efforts, has lent wonderful support to our contemplated activities for this Christmas. None of our contractor members are outstanding artists but we went into the project last winter with the spirit of determination. It has been very gratifying to receive comments from all parts of the United States as to our ability to put such a project across. We are completing plans now for our coming Christmas campaign which will be considerably greater than any activity of this sort sponsored in Wyoming before.

"Our own display will be on the same plan as that of last year, using most of our former equipment except that we are planning to add the Three Wise Men which will appear in the distance, and our lighting effects, because of the experience we have had, will be greatly improved. To the Casper electrical contractors, the finest result has been the goodwill created among the contractors by the close association in which we were drawn during the staging of the campaign."

As a further indication of cooperation, pictures of the contractors' lighting display were taken by Frank M. Howard, meter superintendent, Mountain States Power Co., at Casper, who also photographed the prize winning homes and the display at the power company office shown on the facing page.

The contractors' display was made of cutouts, painted, and so arranged in size and lighting to give the appearance of distance and depth. The manger stall was a roof protecting the creche as well as a place in which to conceal the necessary lighting. The star overhead was suspended by messenger cables from two poles some distance away so as to be inconspicuous. The star was fabricated of translucent material so that, lighted from the inside, it glowed with light.

Everywhere in the West similar activity will be started this month. The first Christmas outdoor lighting originated in the West and each year has extended. To name one would be to name all, and such a list would take a directory to an atlas. In the Rocky Mountain region the newspapers and the League sponsor the movement. In California it is the Outdoor Christmas Tree Assn., started by Clarence "Sandy" Pratt.

Lighting committee of the Casper Electrical Contractors' Assn. whose efforts made the front cover picture possible. Left to right are Don Germond, secretary; F. R. Peebles, Mark Rowley, president; A. L. Forster and A. W. Thiele.

Merry Xmas in Light

Presenting a variety of last season's Christmas lighting ideas in the Western states

Up at Grand Coulee last Xmas employees of the contractors there built a real tableau in the Civic Center of Mead City. Giant figures, animated, moved about a huge lighted fir tree. Via a sound system, carols were sung and a wonderful spirit prevailed as this illuminated display revolved merrily around

One of the first prize winners in Casper's (Wyo.) outdoor Xmas lighting contest held last year was this decorative home display below. It combined tree lighting with the use of cut-out figures and scenes with real effectiveness. This is typical of the extent to which enthusiasts carry on the Yuletide spirit in the West

Mountain States Power Co. office at Casper, Wyo., is set back from the street. In the parking space in front of it, this two-story tree was placed. Colored lights covered this mighty spruce and the adjoining lamp post. And over the office doorway, a Xmas greeting sign was hung. (Below) Each year a Xmas Tree lane is created in San Diego's Balboa Park, scene of the 1915-16 and 1935-36 Expositions. At the end of the lane is the Bureau of Radio and Electrical Appliances annual Christmas Exposition. A fascinating avenue of light can be created on main streets or in civic centers

Even Southern California (picture at left), without snow and with its Spanish architecture, goes in for Xmas tree lighting out of doors. Note the effective lighted doorway and the height of the tree. (Below) Stores and offices in the West decorate, too. Power company offices, such as San Joaquin Power division, Pacific Gas and Electric Co., at Fresno, combine the decorative quality of an electrical kitchen with special holiday lighting and decoration. Major appliances are wrapped as gifts with large bows, and small table appliances are featured in this modern display room

ELECTRICAL WEST

The All-Industry Magazine of Progress

Established 1887 and Incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity"

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What Are the Answers?

THERE are times when people in the utility business are justified in showing something more than mere perturbation and irritation at activities of governmental agencies. One such circumstance is the recent Federal Power Commission investigation of alleged political expenditures of Pacific Northwest utility companies. The hearings were conducted in Seatte, Spokane and Portland—most of them just before the election. If someone connected with the FPC would answer the following pertinent questions, the minds of many utility people would be considerably relieved:

Why were the hearings held in the Coast cities when ordinarily such investigations are conducted in Washington? Was there any significance in the time selected, i.e., a couple of weeks before the election? Was it purely coincidence that Washington voters were to pass upon controversial Initiative 139, which would require public elections before PUD's might issue revenue bonds? Why were the companies denied the privilege of examining the complaints against them? If licensees under FPC were being investigated, why were the two large municipal utilities in Washington exempted?

Unless satisfactory answers can be provided for these and other questions about the hearings, the obvious conclusion must be that expressed by the *Oregon Voter* in its recent comments on federal dictation: "The strong will is making itself felt; this legislation is in line with its real purpose, to obtain power and more power and more power; and use that power to hinder, compete with and finally destroy American private enterprise in the electric industry and many other industries."

Gas Steps Out

IF IT is good sales startegy to know what your competition is doing, then it may interest a lot of people in the electrical business to learn that gas is slated for a lot of national cooperative promotion and advertising in 1941. The American Gas Association advertising committee will spend upwards of $500,000 advertising gas for domestic uses in seven national magazines, and for industrial uses in many business and industrial publications. In addition, the gas appliance manufacturers have budgeted $115,000 for cooperative advertising of the "CP" gas range.

About the only satisfaction the electrical industry can derive from this news is that of saying, "Well, we made 'em do it." It was the increasing popularity of the electric range plus the enthusiastic sales drive the industry was putting back of this appliance several years ago that aroused the gas people to start their national program. Now the gas copy reads, "Let gas do the 4 big jobs—cooking, water heating, refrigeration, housheating." And the industrial theme has been added to the program. A taste of success was enough to send the gas industry on its way to a place where its industry cooperative promotional activity exceeds that of almost any other business.

Some day, perhaps, the electrical industry will profit from its past experience and the example of its competition. Its cooperative program helped to put over the electric refrigerator. It has popularized Better Light-Better Sight. And what a whale of a job it could do with a lot of other electric uses in the home if it put its money and brainpower back of them in some national cooperative campaigns. That won't happen until a lot of individual people in the business see the advantages of such a program and sell it to the whole industry.

Use Experience

ONE of the wierdest conflicts today is that between the divergent points of view within the national administration over the defense program. On one hand industry has been told to cooperate "or else" by the President and from the Department of Justice comes an equally stern

warning, "Don't you dare—."

"In organizing the national defense," as Walter J. Walsh, naval expert, engineer, trade association attorney, points out," the keystone is our industrial strength. This strength is inert and helpless unless organized. The construction industry, to which we must look for construction of vitally needed airports, bases, warehouses, supply depots, fortifications, docks and other necessities, must cooperate where it will require the mutual resources of several to take over one job."

Further, he points out, the construction industry consists of at least 150,000 separate enterprizes, some 70,000 of which are specialty or subcontractors. Three quarters of these have assets of less than $50,000, their real assets being their knowledge and experience in taking a job and doing it. Valuable assets to a national defense program. In order to enlist these and to get quick results, it will be necessary to allow crafts to coordinate their efforts to a common purpose.

In a nation that has been built by coordinating of cooperation and free initiative, business should be allowed to make vertical and horizontal combinations of a permanent or temporary nature as required by the object to be attained so long as these are in the public interest. The quicker the nation realizes this fundamental truth and abandons some of its punitive restrictive laws that make a crime of any kind of cooperation, even the good kind, the better for the safety of the nation and its economic well being.

Here Comes the Code

MUCH discussed, eagerly awaited, the 1940 edition of the National Electrical Code has now reached the hands of those who are to put its provisions into effect. In it is incorporated the new knowledge of wire carrying-capacities, the permissible use of new wires for rewiring of old buildings, new identification of motors, and many other changes which have come into it as a result of experience and invention.

It is by no means a perfect code. There never will be such a code as long as the industry is growing, inventing, expanding, doing research. Nor will its issuance mean that it can be worked under universally, unfortunately. Many cities still operate under the 1935 Code, some even earlier editions. Many cities now, whose inspectors take issue with some provisions, may delay adoption or do so with reservations. Perhaps that will always be the case.

But of late years there has been less tendency to be so exclusive, so backward. It is more universally recognized that the code is the best available compromise between the numerous conflicting views of the entire industry, that it is democratically prepared and revised, that it can be changed again where it is found wanting.

Desirability of uniform wiring rules and of interpretation is prevailing over prejudice, however, and possibly more cities and towns will accept and approve the 1940 Code than have ever accepted a similar previous edition. The increasing complexity of electrical installation almost demands that this public service be given to electrical consumers everywhere.

Package Units for Defense

AS INDUSTRIES expand to gain capacity for defense building, a critical question faces the electric utility. How long will such plant remain in service?

Ordinarily, when the utility extends its service to an industrial customer, it takes its risk along with the customer himself—the risk of the plant's closing before it has paid off, before the cost of connecting it has been paid off.

In ordinary circumstances the risk is automatically minimized by the fact the customer is doing his utmost to become and remain a going concern.

Today, for defense purposes, the industrial customer can expand his plant with no thought for anything beyond the next five years. In that time he is permitted to amortize his cost. Not so the electric utility.

Perhaps for some reason, perhaps for none, the utility was not included in this inducement to expand. Yet it takes no clairvoyance to see that the utility will be expected to "go along." It will be asked to spare no effort to connect defense plants quickly, but amortizing the costs will be something for the utility to figure out for itself.

This kind of figuring has already kept many an engineer awake at night, and there's going to be much more of it to do. The difficulty is there to be faced and overcome.

A possibility which is gaining favor with many thoughtful engineers is that of serving these loads on the assumption that they may be temporary, using equipment which is mobile to a high degree. Such a solution naturally favors the use of package substations and portable substations which may at minimum cost be moved to serve other loads.

The period ahead may demonstrate that these mobile units made their appearance in a timely hour, and that the familiarity with their use which has developed in the last five years may be invaluable in the five to come. They may prove life savers to electric systems when armament production tapers off.

PCEA Lights the Way

Fifteen regional meetings throughout California draw three thousand electrical men to hear excellent programs

ITS SWING of the circuit completed, the PCEA regional meetings closed Friday, October 25 at San Diego to bring the total attendance for the 15 meetings to 2,760. Better received, more timely, and with greater turnout the fourth annual series of regional meetings for those unable to attend the conventions and conclaves and to bring the PCEA closer to the industry throughout the territory was thought by C. E. Houston, president, and Victor Hartley, managing director, to be the best yet.

The speaking group for all meetings included Dr. G. W. Allison, field representative, Modern Kitchen Bureau, New York, and an illustrated presentation on adequate wiring, "Thar's Gold in Them Thar Hills". The feature final speaker the first week was Dr. F. P. Woellner, professor of education, U.C.L.A.; for four meetings of the second week, F. T. Letchfield, vice president, Wells Fargo Bank and Union Trust Co., San Francisco; and the remaining meetings Dr. W. B. Henley, Director of Coordination of the University of Southern California, and Lloyd Wilson, director of publicity, San Francisco Y.M.C.A.

Dr. Allison's talk stressed the fundamental idea that there is a right way to sell and that such a right way can even be bettered by study and work. He compared the haphazard individualistic and highly competitive efforts in selling of automobiles, tires, and other commodities 25 years ago with the coordinated and cooperative selling today which produce far greater volume at lower cost to the consumer. Particularly did he stress the fact that even though the story may be old to those in the industry, there is a new generation of buyers every year who have not heard it before and that the use values must continually be sold.

The slide film and sound presentation on adequate wiring illustrated how any employee can help make the public conscious of its need for more adequate wiring by pointing out its necessity in modern living.

Dr. Woellner in a brilliant, humorous and penetrating talk illustrated how, to make a perfect sale, one must believe in his goods, believe in himself, believe in his firm, believe in his industry, and believe in the American way of life which makes his opportunity and his livelihood possible.

Letchfield in his talk gave a critical analysis of what he calls the present insane period in world affairs. This insanity he characterized as one in which people are exchanging liberty for fanciful security. He exploded the popular fallacy that technological unemployment exists, that there is maldistribution and that restriction of production is the way to a controlled economy. He stressed the necessity since time began of the individual to assume responsibility for his own future and pointed to the dangers in the philosophy which preaches a type of feudalism or caste or class consciousness.

Dr. Henley talked more on the individual's public relations responsibility for his company, his industry and himself. It is important for the individual to condition the public with favorable thoughts about his company by making them think favorably of himself, he declared. Any indication of unfavorable public relations should be analyzed carefully. If the analysis shows the faults lie with the individual, immediate steps should be taken to correct the condition. If the fault grows out of public misunderstanding, the need is for intelligent effort to eliminate false ideas. He urged people to learn to take criticism gracefully and to better themselves through criticism.

Lloyd Wilson spoke much along the lines that he had addressed the convention at Oakland in May. Solutions for economic and social problems, he declared, have been coming from theorists, idealists and many who had been failures at their own businesses and affairs. He thus challenged people in business and industry to solve these problems from their practical aspects. (See ELECTRICAL WEST June, 1940, p. 156).

Present at the Sonoma meeting were (left to right) Dr. G. W. Allison, Modern Kitchen Bureau; Clyde Houston, president, PCEA; Cliff Bartlett, North Bay District mgr., PG and E; Dr. Woellner

Attendance at the various meetings was as follows: Reno, Oct. 7, 103; Sacramento, Oct. 8, 308; Chico, Oct. 9, 189; Sonoma, Oct. 10, 129; San Francisco, Oct. 11, 328; San Jose, Oct. 14, 193; Watsonville, Oct. 15, 185; Fresno, Oct. 16, 235; Bakersfield, Oct. 17, 185; Santa Barbara, Oct. 18, 179; Huntington Park, Oct. 21, 177; Long Beach, Oct. 22, 153; Riverside, Oct. 25, 178; El Centro, Oct. 24, 90; San Diego, Oct. 23, 128; a total for the entire 15 meetings of 2,760.

C. E. Houston, president of the Association, attended most of the meetings and conducted them after being introduced by the local chairman. Vice President Ken Ryals, San Francisco, conducted the meetings at San Jose, Watsonville, and Fresno.

Northern and Southern Conclaves Under Way This Month

AT Hotel Oakland, Nov. 7-8 and in Hotel Huntington, Pasadena, on Nov. 14-15, PCEA conclaves will be in session. Electrical men from all over the West will gather to hear, learn and speak of their electrical industry and its various aspects. The full program, combining north and south meetings, is as follows:

Thursday

9:30 GENERAL ASSEMBLY
Opening Remarks — President C. E. Houston
Announcements

10:00 PARALLEL SESSIONS (See detailed program following)

12:15 LUNCHEON

2:00 Continuation of Parallel Sessions (See detailed program following)

Friday

9:00 Continuation of Parallel Sessions (See detailed program following)

12:00 LUNCHEON
Panel Discussion—Developed and Presented by the Administrative Services Section.
Subject—"How to create a public relations consciousness in an organization."
Chairman—North, G. S. Tenney, ELECTRICAL WEST
South, S. E. Gates, General Electric Co.
Panel Members—*North*, R. E. Fisher, Vice-President in Charge of Public Relations and Sales, Pacific Gas & Electric Co.
Chas. E. Dostal, Pacific Coast Manager, Westinghouse Electric & Manufacturing Co.
Almon E. Roth, President, Employers' Council, San Francisco
Dr. Paul Eliel, Director of Industrial Relations, Graduate School of Business Administration, Stanford University.
Rilea W. Doe, Director of Public Relations, Safeway Stores
C. E. Persons, Vice-President, McCann-Erickson Co.
E. C. Lipman, Managing Director, The Emporium.
South, Paul Armstrong, General Manager of the California Fruit Growers Association.
John Canady, Public Relations Manager, Lockheed Corporation.
Fox Case, Director of Public Relations, Columbia Broadcasting Co.
Thurston Ross, Professor of Industrial Management and Director of Bureau of Business Research, U.S.C.
J. A. Purdy, Vice-President, Personnel and Operating Department Bank of America—T. N. & S. A.
W. G. Jerrems, Personnel Director, Douglas Aircraft Corp.
E. M. Barber, Vice-President and General Manager, Boyle Manufacturing Co.

3:00 ADJOURNMENT

Parallel Sessions

Business Development Section

R. C. McFadden, Chairman; E. G. Stahl, Vice-Chairman

Thursday

RED SEAL ADEQUATE WIRING COMMITTEE—G. E. Zelhart, Chairman
1. How to organize the entire industry by the Red Seal Wiring Program
2. How to secure the interest and support of builders and financing agents in Red Seal wiring standards.
3. How to secure interest of architects and home planning services in Red Seal wiring standards.
4. Report of the Standardized Services Committee—J. H. Pengilly, Chairman.

CODE AND ORDINANCE COMMITTEE—C. E. Heise, Chairman; E. F. Watkins, Vice Chairman
Discussion of promotional methods
Discussion of proposed changes in Uniform Electrical Code.

INDUSTRIAL POWER AND HEATING COMMITTEE—G. N. Hawley, Chairman

10:00 A.M.—Subcommittee on Competitive Power—J. P. McElroy, Chairman
1. "The problem of bottled gas competition."
2. Brief review of last year's accomplishments of Competitive Power Committee.
3. Discussion of advisability of collecting further data on competitors.
Discussion Leader—A. L. Laws
4. Discussion of adoption of uniform method of reporting business gained and lost by utilities
5. 1940-41 plans for a definite method of meeting competition.

2:00 (north) and 3:30 (south) Subcommittee on Industrial Data Sheets—J. A. Corlett, Chairman.
1. "Exchanging power sales experiences by means of Industrial Data Sheets" Discussion Leader—E. E. Petersen, north; W. B. Cheney, south.
2. Discussion of effective means of compiling and distribution Industrial Data Sheets.

2:00 P.M. (South only) Subcommittee on Welder Ratings—H. G. Dillin, Chairman
1. Discussion of work done by 1939-40 subcommittee.
Speaker—C. L. Ashley.
2. A uniform method of rating large welders.
3. Utility policy on serving welder loads.

PETROLEUM ELECTRIFICATION COMMITTEE—L. S. Peterman, Chairman
(South only) AC & DC Electric Oil Well Drilling—P. L. Savage
Cathodic Protection of Pipelines—Gordon N. Scott, Pipeline Technologist
Smithway Electrical Pumper—Lloyd Yost, A. O. Smith Corporation.

HIGHWAY LIGHTING COMMITTEE—A. E. Holloway, Chairman
(South Only) Report of Technical Subcommittee—G. H. P. Dollmann, Chairman.

GENERAL LIGHTING GROUP—Discussion Leaders, J. S. Walsh, north; W. H. Robinson, Jr., south.
10:00 "Lighting America"—W. E. Carlson, north; W. H. Robinson, Jr., south.
10:15 "The Lighting Industry—Its Growth—Past, Present, and Future." John S. Walsh, north; W. A. Cyr, south.
11:00 "Light Sources—New Developments"—S. H. Hazelton, Jr., north; Alston Rodgers, south.
2:00 "Industrial Lighting Potentialities"—H. R. Robison, north; W. Trent German, south.
3:00 "Residential Lighting Development Programs"—C. H. Wissing, north; G. H. P. Dollmann and J. T. Deppe, south.
4:00 "Fluorescent Lighting Applications"—Kenneth K. Knopf, north; Frank Anderson, south.

RANGE AND WATER HEATER GROUP—Discussion Leaders, B. W. Reynolds, north; A. W. Althouse, south.
1. Electric Ranges
a. Mortality. Discussion Leader—Kenneth Hampton
b. Problem of co-ordinating sources of supply to successfully conduct industry campaigns with uniform customer inducement that can be advertised simultaneously by all participants. Discussion Leaders—Charles Meier, north; W. E. Cranston, south.
c. Problem of securing and maintaining dealer interest in electric ranges. Discussion Leaders—R. D. Thomson, north; H. D. Conklin, south.
d. Problem of getting the retail salesmen to make a better presentation to the customer. Discussion Leaders—Harold D. Conklin, north; H. L. Moore, south.
2. Electric Water Heaters
a. Standardization of specifications.—Discussion Leaders — Howard Oliphant, north; C. H. Kaufman, south.
b. Water heater sales
1. Combination with range.
2. To range users.—Discussion Leaders—Howard Oliphant, north; W. S. Fleming, south.

AGRICULTURAL POWER GROUP—Discussion Leaders, B. D. Moses, north; L. W. Smith, south.
"Methods for the Development of Agricultural Electric Business," A. M. Frost, V. A. Bloxham, south.
"An Approach for Developing the Dairy Load"—T. W. Christiansen, north; Dr. R. P. Gingerich, south.
"An Approach for Developing the Poultry Farm Load"—T. A. Wood, north; P. P. Pine, south.
"The Relation of Electrical Industry to Agricultural Clubs and Schools"—Paul Ford, north; Julian A. McPhee, south.
"Quick Freezing of Farm Produce for Farm use"—(north only)—A. B. Conant.
Open Forum:
Short discussions on any agricultural phase that the attendants may desire.
A Recapitulation, with suggested projects and practices.

AIR CONDITIONING GROUP — Discussion Leader, H. H. Douglas (South only), Round-Table discussion on Evaporative Cooling.

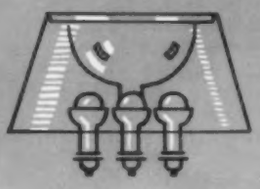
Friday

9:30 GENERAL ASSEMBLY OF SECTION
1. "How can fluorescent lighting be used to the best advantage of the purchaser"—Discussion Leaders—Clark Baker, north; Frank Hansen, south.
2. Report of the Sales Campaign Plans of the Edison Electric Institute—R. E. Fisher
3. "Water Heaters Everywhere—And Not a Drop to Drink"—W. A. Cyr.
4. "Market Surveys and Market Analysis"—J. O. Holbrook, Asst. General Sales Manager The Paraffine Companies.

Another STEP IN MODERN METERING..

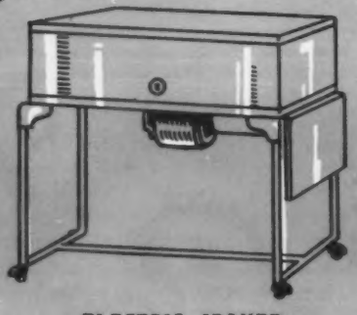
ELECTRIC ROASTER

1000 WATT IRON

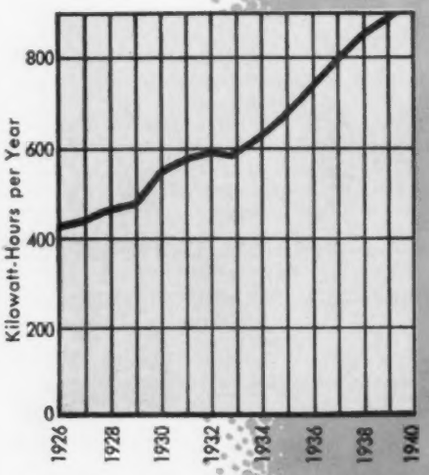


I. E. S. LAMPS

ELECTRIC BROILER



ELECTRIC IRONER



Up goes the curve! As shown above, the average residential consumption of kilowatt-hours has more than doubled since 1926. Home appliances are almost entirely responsible for these gains. Modern merchandising promotion can be expected to keep this trend continually upward. Considerable revenue losses often result from metering these added appliance loads with old, uncompensated meters . . .

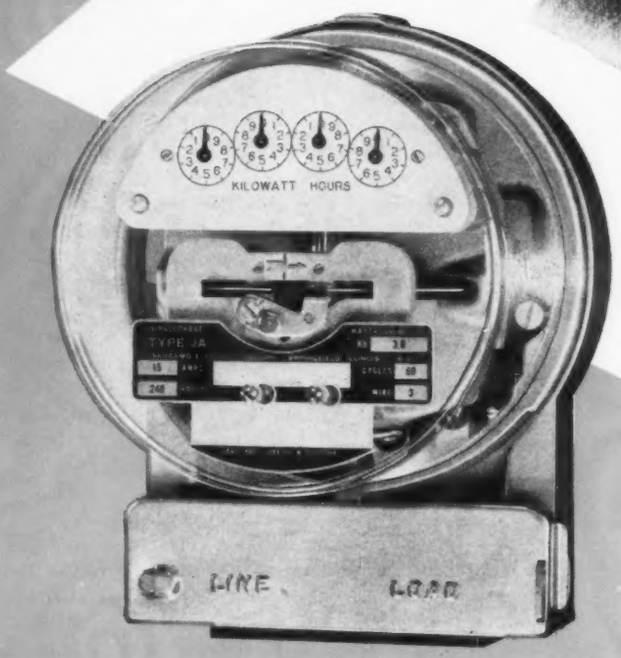
NOW comes another step in modern metering . . . the Sangamo Type J Meter. Taking full advantage of recent metallurgical and engineering developments, this meter incorporates . . . a damping magnet system highly resistant to surges . . . a bearing system requiring no lubrication . . . raised insulation values to meet the more severe operating conditions of outdoor installations . . . and wide range load and temperature compensation.

These features, summed up, have but one purpose: to register accurately the loads imposed by today's diversified electrical appliances. In brief, use of the Type J Meter results in full revenue for all load gains.

PAYLOADS WHEN METERED WITH MODERN METERS

SANGAMO ELECTRIC

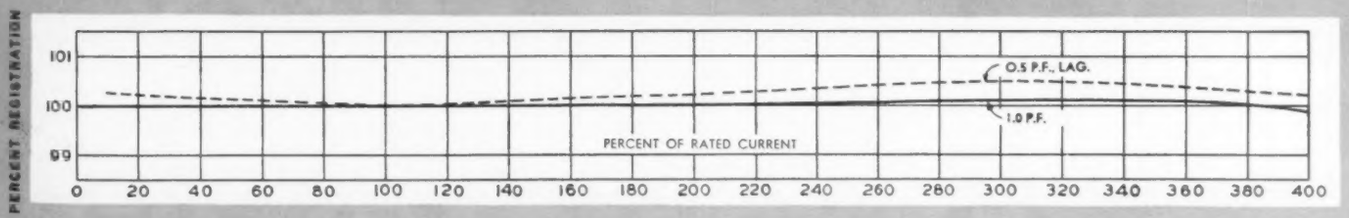
THE SANGAMO TYPE J METERS



SANGAMO TYPE JA WATTHOUR METER

SANGAMO TYPE JS WATTHOUR METER

AVERAGE LOAD CHARACTERISTIC CURVE OF THE TYPE J METER



COMPANY SPRINGFIELD ILLINOIS

Administrative Services Section

E. A. Long, Chairman
S. W. Murray, Vice-Chairman

ACCOUNTING GROUP—F. C. McLaughlin, Sponsor. The Accounting Group will meet Thursday and Friday at the Southern Conclave, but on Friday only at the Northern Conclave.

WOMAN'S COMMITTEE—Mrs. Eleanor Connel, Chairman; Miss Helen Kent, Vice-Chairman. The Woman's Committee will meet at 6:15 Thursday evening at each of the Conclaves for dinner, at which they will discuss plans for exchanging information regarding Women's Activities in their various companies.

CREDITS, COLLECTIONS, AND CUSTOMERS RELATIONS — Sponsors — L. C. Rausch, North; Chas. Davies, South.

Are our present monthly statements understandable to the public? Could a change be suggested that would improve public relations?

Discussion Leaders—Paul Thompson, north; Leon Heseman, south.

Is it desirable to have neighborhood collection agencies?

a. From public relations standpoint.
b. From accounting standpoint.
c. From collection standpoint.

Discussion leaders—K. L. Boosey, north; Lloyd Dolan, south. Reconnections and service after hours.

a. Public relations value.
b. Routine of handling.

Handling of domestic meter applications over telephone.

a. Value from public relations angle.
b. From collections angle.
c. From operating costs angle.

Discussion Leaders—Ray W. Piercy, north.

Address by Economist:

North—Speaker:—Harry W. Smith, Vice-President, Bank of America. Subject: Democracy in a Changing World."

South—Speaker: Harrison Mathews, Professor, Woodbury College. Subject: "What do the next few years offer."

TRANSPORTATION GROUP—Sponsor, E. C. Wood.

Selection of Automotive Equipment—Discussion Leaders—S. B. Shaw, North; C. D. Weiss, South.

Inspection of Automotive Equipment—Discussion Leaders—E. C. Wood, North; P. H. Ducker, South.

PURCHASING AND STORES GROUP—Sponsor, W. deWaard.

Standard Packages of Line Hardware, Strain Insulators, Dead End Clevises with Spools Assembled, and Service Insulators.

Discussion Leaders—H. H. Scoville, J. P. Schaeffer and J. M. Culverwell, North; R. W. Thomas, W. de Waard, South.

Storeroom Equipment and Material Handling Devices.—Discussion Leader—B. D. Haugh.

Re-Use of Secondhand Material.—Discussion Leaders—A. A. Charonnat, North; W. F. Dickinson, South.

Reciprocity in Purchasing and Purchases Affecting Public Relations. Discussion Leaders—E. A. Long, North; E. F. Watkins, South.

Roundtable discussion relative to pertinent facts of Purchasing and Storekeeping.

Operating Economics Section

G. E. Bishop, Chairman
A. D. Brown, Vice-Chairman

TRANSMISSION, DISTRIBUTION, AND SUBSTATION GROUP

Thursday

10-11 Two-Way Radio Communication—Discussion Leaders—H. S. Lane, North; T. Hotchkiss, South.

11-12 Automatic Reclosing of Oil Circuit Breakers—Discussion Leaders—H. A. Laidlaw, North; H. L. Sampson, South.

2-3:30 General Review of Voltage Regulation. Discussion Leaders—R. R. Cowles, North; J. B. Bowen, South.

3:30-5 Fire Prevention for Substations—Discussion Leaders—Frank Beardsley, North; D. J. Kennely, South.

Friday

9-10 Rehabilitation of High Voltage Bushings. Discussion Leaders—Leo L. Perrin, North; P. P. Nevin, South.

METER GROUP

Thursday

10-11 Temperature Error Correction on Old Style Meters. Discussion Leaders—H. D. Noren, North.

11-12 Protection of Meter from Corrosion. Discussion Leaders—T. C. Wren, North; K. Stevens, South.

3:30-5 A Study of General Test Practice and Equipment Used for Field Testing. Discussion Leaders—J. C. Able, North; L. H. Beebe, South.

Friday

9-10 Demand Meter (Block Interval Type) Maintenance and Test Period. Discussion Leaders—L. D. Tycer, North; F. A. Redding, South.

STEAM GENERATION GROUP—Presiding—V. F. Estcourt, North; H. A. Noble, South.

Thursday 10-12 and 2-5—Roundtable Discussion of Problems.

Friday 9-10—Roundtable Discussion of Problems.

HYDRO GENERATION GROUP—Presiding—G. H. Bragg, North; J. C. Gaylord, South.

Thursday 10-12 and 2-5—Roundtable Discussion of Problems.

Friday 9-10—Roundtable Discussion of Problems.

SAFETY COMMITTEE — Howard Miller, Chairman.

Thursday 10-12 and 2-5—Friday 9-10—

Pole top resuscitation

Reports of cases where the pole-top method was used this year.

Discussion on training linemen in this method.

Rubber Gloves

When they should be worn

Methods of testing, both in the field and laboratory

Grounding

Methods of grounding lines, busses, and apparatus taken out for work.

Methods and devices for proving equipment to be de-energized.

Working on bond wires

What hazards are involved in working on wire bonding the hardware of lines of 10 kv. and above, on wood poles.

What precautions should be taken.

Friday, 10:30-12 General Assembly Section Speakers, North—Professor Elliott G. Reid, Stanford University. South—Dr. R. W. Sorensen, President, A.I.E.E.

● A CAMPAIGN TEAM to direct the "Give Something Electrical for Christmas" program of the Denver Electrical League has been named. V. N. Garretson has been named chairman, distributors' division; O. S. Scott, chairman, dealers' division; James H. Blinn, chairman, manufacturers; Ralph E. Johnson, chairman, contractors; and John M. DePue and E. M. Rowland. They will have charge of the Denver Exposition and will assist in arranging the sales activities on behalf of all member companies and dealers in general.

IES Gatherings

Regional president Hansen tours Pacific Coast states

Newly appointed regional vice-president for Illuminating Engineering Society for 9 Western states, Frank A. Hansen, also director of Western Institute of Light & Vision, Los Angeles, made a swing around through the Northwest and San Francisco on his return from the IES convention in New Jersey. Meetings were held in Spokane, Seattle, Portland, and San Francisco (Sept. 24, 25, 26 and 27 respectively) with members of the IES. Preliminary details for the formation of chapters in Seattle and Portland were discussed. In San Francisco, the San Francisco Bay Cities Section discussed with him plans for a 1941 IES regional conference in that city.

In his report of the national convention, Hansen brought the following news announcements of particular interest to the West: There have been 4,600,000 IES tags issued for floor and table lamps and an estimate is made that 4 times as many of a similar type of lamp have been sold without bearing the tag. The IES will soon start certification of residential lighting equipment much along the same lines as IES floor and table lamps. Residential lighting data sheets will be added to those for commercial and industrial lighting issued in the past. The Beaux Arts competition sponsored by the IES will be opened up regionally so that competition in it can be entered from the West.

Respecting the regional set-up of the IES, of which he is vice-president, Hansen announced that a small printed bulletin would be issued for circulation to members in the nine states and also to architects and prospective members. Arrangements to have returned a large proportion of the membership dues paid by western members for work in the western field were also made.

Because of the transfer of Leonard Hobbs to Los Angeles, his resignation as chairman of the San Francisco Bay Cities Section was accepted with regret and announcement was made that the board of managers had appointed Kenneth K. Knopf, Westinghouse Electric & Mfg. Co., as the acting chairman in his stead. Walter Carlson, Lamp division, General Electric Co., is vice chairman; Matt Sissich, Pacific Gas and Electric Co., secretary; and the board of managers consists of Fred Wellhouse, Westinghouse; Robert Dummel, Holophane Co.; Gilbert Trosper, PG and E, and Nate Graves, past president, PG and E.

WEBSTER ELECTRIC

Teletalk

REG. U.S. PAT. OFFICE

Amplified

Intercommunication

Sells for $49.00 and Up

2 STATIONS $49.00
Above shows a Model 105 and Speaker-Microphone 5A-45. . . . Sketches show additional combinations
3 STATIONS $58.50
4 STATIONS $68.00
5 STATIONS $77.50
6 STATIONS $87.00
Various combinations of Models and Types at Proportionate Prices

It carries a good profit and you make a profit on material and labor, too . . . . There are *thousands* of places to sell it . . . .

Any electrical contractor who is not taking advantage of the rapidly increasing interest in amplified intercommunication is just simply passing up a whale of a lot of very profitable business.

If you are a contractor who thinks of Teletalk only as high priced equipment that can be sold only to large industrials, you are mistaken.

Look at the illustration and chart at the right. There are thousands of places you can sell and install the smaller Teletalk systems. Home owners are installing them. Small shops are finding two, three and four station systems to be indispensable. Professional men and small businesses say that Teletalk is saving their time, saving footsteps for their employees and reducing fatigue—in short, simplifying their daily routine to an immeasurable degree.

When Teletalk is once installed, satisfaction increases daily. If you don't believe this, try having a demonstration in a prospect's place of business for one week. You'll make a sale—and a profitable one, too, because a Teletalk installation means the sale of wire, conduits, junction boxes as well as labor.

If you want to get some of this profitable business insist upon the full cooperation of your local Webster Electric Distributor, or, ask us how to show you the easy way to do it.

Licensed by Electrical Research Products, Inc., under U. S. Patents of American Telephone and Telegraph Company and Western Electric Company, Incorporated

WEBSTER ELECTRIC COMPANY, Racine, Wis., U. S. A. Established 1909. Export Dept.: 100 Varick Street, New York City • Cable Address: "ARLAB", New York City

Webster Electric

"Where Quality is a Responsibility and Fair Dealing an Obligation"

MANUFACTURERS OF TELETALK INTERCOMMUNICATION AND PAGING SYSTEMS • POWER AMPLIFIERS AND SOUND DISTRIBUTION EQUIPMENT • RADIO PHONOGRAPH PICKUPS • IGNITION TRANSFORMERS AND FUEL UNITS FOR OIL BURNERS

NEWS OF THE INDUSTRY

FPC OPENS HEARING ON "POLITICAL ACTIVITIES"

To determine whether or not five private utility companies operating in the Pacific Northwest have engaged in improper political activities during recent years, the Federal Power Commission opened a hearing in Seattle on Oct. 14.

Samuel H. Crosby, of Washington, D. C., is presiding over the hearing as trial examiner and Lambert McAllister is the commission's chief counsel.

McAllister stated the hearing is the culmination of complaints which the Commission has received during the past five years from individuals and groups and that "our purpose is to determine expenditures that may or may not have been made by utilities on political activity, and, if any, the manner of their accounting."

The hearing will extend to five companies: Puget Sound Power & Light Co., Northwestern Electric Co., Pacific Power & Light Co., Portland General Electric Co., and the Washington Water Power Co.

Early in the hearing, Samuel P. McFadden, Puget Sound Power & Light Co. vice-president, admitted under questioning that his company had paid the Washington State Taxpayers Assn. some $18,750 this year for "protecting the company and its investors, employers and customers from the results of excessive and unnecessary taxes."

McFadden further said that there were public utility districts in 13 of the 19 counties in which his company operated, adding that his company last year paid $29,622 for the total of $709,746 taxes levied by the PUDs in these counties.

On Oct. 16, Floyd Oles, director of the Washington State Taxpayers' Assn., refused to produce the association's records for investigation, saying the Commission's actions were "un-American."

★ Politics—Proponents of Initiative 139 saw in the investigation a move to defeat this bill, which would force a vote on all revenue bond issues.

ALUMINUM COMPANY BUYS 97,500 KW. AT BONNEVILLE

An additional 97,500 kw. of Columbia river power was sold last month to the Aluminum Company of America by the Bonneville-Grand Coulee Power Administration to speed production of aluminum for national defense.

Paul J. Raver, Bonneville-Grand Coulee Power Administrator, said that the large block of power would be used to supply the requirements of three new aluminum production units to be built immediately at the company's new plant on the banks of the Columbia just west of Vancouver, Wash.

The company already had contracts with the Power Administration for 65,000 kw. of capacity, enough to produce 60,000,000 lb. of aluminum a year. The new plant capacity provided by the contract signed today will boost the company's production to 150,000,000 lb. annually. Most of the metal will go directly into airplane construction, officials said.

Alcoa has agreed to begin construction immediately on a third unit at its Vancouver plant. One unit has already been constructed and is in operation and a second is nearing completion.

The third unit is to be completed next April 1. A fourth unit will be completed on May 1 and a fifth unit on June 1. Power deliveries are scheduled to start as soon as units are ready for operation. As each unit is completed it will use an initial 27,000 kw. This delivery will be increased at the rate of 500 kw. per month until each unit is using a total of 32,500 kw.

★ Defense—Because aluminum is one of the essential national defense minerals, Aluminum Company is expending at a rate faster than normal, has scheduled a $150,000,000 expansion program. Its increasing power demands simplify Bonneville's marketing problem.

CANDY PAYS THE BILL

Of all the city utility financing schemes practiced in this country, perhaps Genoa, oldest town in Nevada, offers the most unique one. Here the sale of candy pays the expenses of operating the town's street lighting system.

Each year the women of Genoa sponsor a candy dance at which home-made candy is sold, a midnight supper is served, and admission charged—all funds derived being given to the street lighting fund.

It would seem to be a case of—"pass the fudge, Mabel, and keep the lights turned on!"

ICKES FINDS PG AND E's PLAN "E" OBJECTIONABLE

Pacific Gas and Electric Co.'s terms for leasing its San Francisco power distribution facilities to the city are "objectionable" to Interior Secretary Ickes.

Notification to that effect was received from him last month in a telegram to City Attorney O'Toole, but what the objections are remain a mystery pending arrival of an explanatory letter.

Secretary Ickes' telegram declared briefly:

"Plan 'E' objectionable. Letter stating objections air mailed."

"I suppose," Mayor Rossi declared, that Secretary Ickes has some recommendations or suggestions to make, but of course I can't tell until the letter arrives."

The one thing upon which the Mayor, O'Toole and Utilities Manager Cahill were agreed was that it is now almost impossible to have a "buy or build" revenue bond issue placed before the election prior to January.

Any election prior to that date, they reasoned, would run afoul one or both of two difficulties. One was the necessity of placing before the Board of Supervisors for approval a plan of acquisition on Oct. 25, inasmuch as notice by publication must be given 40 days before balloting.

The other stumbling block is that a week's delay, if that should prove to be the case, would place an election on Dec. 24, which is the day before Christmas. That, in the opinion of the forecasters, would be impossible.

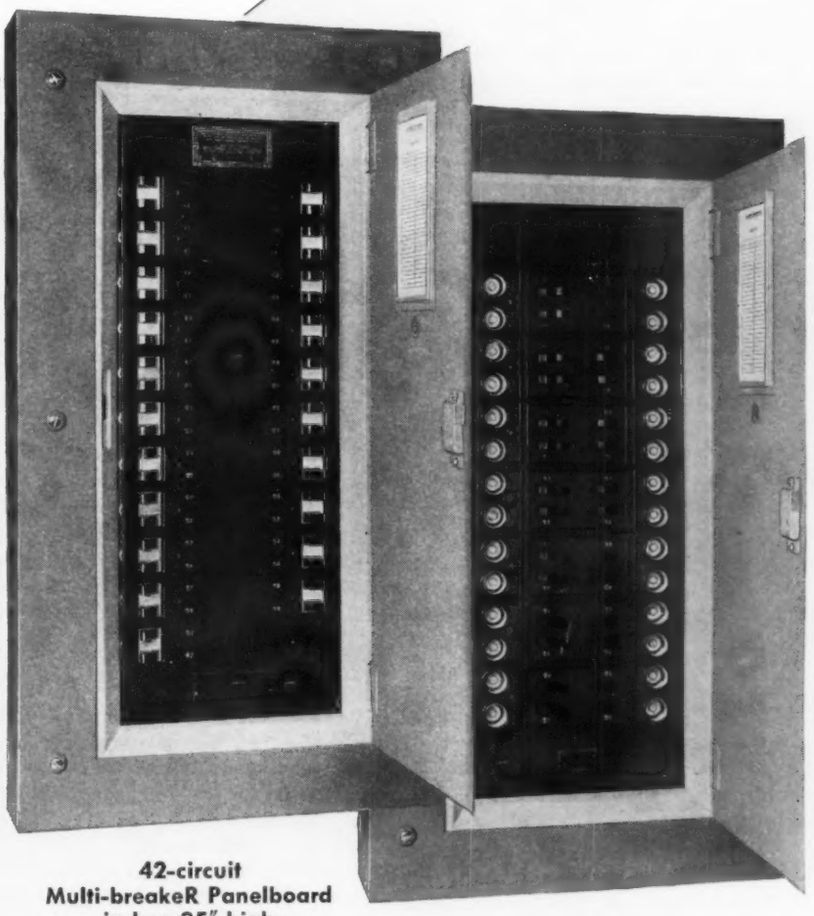
In addition, Utilities Manager Cahill said he needed time to complete details of the alternative plan 9. This is the "buy or build" revenue bond measure, which is expected to call for $62,000,000 in self-retiring securities.

The Utility Workers' Organizing Committee (CIO) announced that its national office had advised of a promise from Secretary Ickes that all accumulated rights of company employes will be protected if a lease should be concluded.

★ Dilemma—Just the barest likelihood remained that a new lease agreement worked out by city and company might prove acceptable to Secy. Ickes. If not, then an election along about the middle of January seemed inevitable, despite nine previous defeats of similar propositions.

MORE LIGHTING CIRCUITS NEEDED?
PRESENT CIRCUITS OVERLOADED?

Here is the Simple Economical Answer



42-circuit
Multi-breakeR Panelboard
in box 35″ high

28-circuit fusible panelboard
in box 35″ high

Use new thin wall wire and SQUARE D MULTI-BREAKER PANELBOARDS

A lot of valuable time is being lost because of overloaded electrical systems. More circuits are needed to take care of the ever-increasing lighting and appliance load.

In the past it has often been impossible to provide for this increasing load without a costly revamping of the entire system. Now the new small diameter wire permits use of more wires in existing conduit. The use of Multi-breakeR lighting panel interiors in present boxes will accommodate the additional circuits made possible by the new wire.

Notice that the Multi-breakeR panelboard illustrated in the same size box as the fusible panelboard will provide fourteen additional circuits. Even in smaller size panels the increase in circuits may be up to 50%.

It is unnecessary to remove lighting panel boxes imbedded in walls. Multi-breakeR panelboard interiors can be installed in present boxes. For such installations, fronts especially designed to fit existing panel boxes are furnished.

Multi-breakeR panelboards provide branch circuit capacity up to 50 amperes.

Square D Multi-breakeRs protect the wire at its rated capacity and will handle inrush currents without needless tripping. When tripped by overloads or short circuits, the current is conveniently restored by moving the handle to the reset position and then "on." There are no parts to replace. Multi-breakeR panels are safe—no live parts are exposed even when restoring current. Due to lower watt loss, Multi-breakeR panels operate at about ½ of the temperature rise of fusible panels. The temperatures necessary to melt fusible links are not required in the operation of the Multi-breakeR unit since the overload element (the bi-metal) becomes hot enough to deflect and release the mechanism only when an overload actually exists.

With thin wall wire and Multi-breakeR panelboards, contractors have the simple, economical answer to an overload problem which exists in scores of commercial and industrial buildings.

SQUARE D COMPANY

LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

CALL IN A SQUARE D MAN

Spokane Votes on Public Utility

Voters in Spokane city and county in Washington will decide at the November general election whether Spokane County shall have a public utility district. Serving this territory as a private utility is the Washington Water Power Co.

Sufficient signatures were obtained through petitions to place the public utility district issue upon the November ballot. At one time during the soliciting, dissension among circulators of the petitions threatened to split the issue. After the petitions first appeared, the Spokane city council voted to include an estimate in its annual budget for investigating municipal power. The action was followed by a petition to the city council to put the question of municipal power and light on the March city ballot, to which the council agreed. Several of the leading factions originally supporting the public utility district move withdrew in favor of the March municipal election.

J. E. McGoran, committee member in charge of petitions, refused to stop circulating petitions and carried the PUD petitions on to obtain enough names to place the issue. According to county officials, legal requirements would not permit withdrawing the issue from the November ballot once the required number of persons indicated that they would like to vote upon the issue through petition indications.

The public utility district movement became a state law in Washington in 1931. In the 1934, 1936 and 1938 elections, twenty-six public utility districts were organized under this law in 25 Washington counties. By Sept. 1, 1940, of these twenty-six PUD's, only six had acquired all or part of the electric utilities in their areas.

In the state of Washington in eight counties—Walla Walla, Columbia, Adams, Yakima, King, Kitsap, Clallam and Island—the public utility district proposals have been defeated once and in some instances twice. Up to the time of the coming November election, six counties—Spokane, Whitman, Garfield, Asotin, Pierce and Jefferson—have not voted on creating a public utility district for the county. November elections will see the public utility district issue decided upon in Spokane and Asotin counties.

In the territory served by the Washington Water Power Co. county-wide public utility districts have been created in Okanogan, Douglas, Grant, Lincoln, Stevens, Chelan and Pend Oreille Counties. A small area in the northeast corner of Spokane County voted for PUD in 1936, but this district has never engaged in business. Of these PUD'S, commissions of Okanogan, Douglas, Grant and Lincoln Counties have started condemnation proceedings against WWP property. These cases are pending in the courts at the present time.

★ Results—By the time readers have this issue, the votes will be counted.

PG and E and State to Discuss Shasta Competition

Opposition to the "confiscatory" policy of erecting public power distribution facilities that parallel existing lines of private utilities was expressed by the State Water Project Authority last month.

In a meeting attended by John C. Page, U. S. Reclamation Commissioner, the Authority proposed a joint meeting with the Federal Government and representatives of the Pacific Gas and Electric Co. to discuss the possibility of joint use of P. G. and E. facilities either through lease or sale to the State "to prevent economic waste of parallel building."

While the Administration stands for the public distribution of Shasta dam power, it also is in favor of promoting free enterprise, Frank Clark, Authority chairman said, adding he felt it would be wise to negotiate with the power company for the purchase or lease of necessary lines to distribute Shasta power rather than to duplicate them.

The day-long meeting was called primarily to work out a Federal-State plan to sell and distribute Shasta power when it is ready.

After Page urged that the two governments stop "sparring around" on the question of responsibility in the project, the Authority adopted a three-point program designed to speed progress in the development of marketing facilities for Shasta power.

The program provides:

(1) The State will prepare a comprehensive power program calling for a survey of the existing market, transmission facilities and for operation of the dam.

(2) For promotion of public agencies as a market for Central Valley power.

(3) Assistance to public agencies in determining methods by which they may finance themselves.

The program is in line with Page's assertion that Secretary of the Interior Ickes wants the Authority to "act as a clearing house and sales agency for Shasta power to public utilities."

★ Who?—The question remains: Who will sell the power?

Bonneville Money Voted By Congress

The Government anted up nearly $8,000,000 last month to speed installation of transmission lines and generators at Bonneville in the name of national defense as the Bonneville Administration declared it would soon contract to supply 100,000 kw. more firm power for aluminum processing in the Pacific Northwest.

The money was voted by Congress at the direct request of President Roosevelt, $3,850,000 to the Bonneville Administrator for additional transmission lines and $4,000,000 to the army engineers to begin work on generators seven to ten, inclusive. In both instances, the appropriation contemplates no expansion of the Bonneville program; rather it makes available scheduled funds earlier than previously called for.

Urging approval of the $4,000,000 appropriation for generating installations, Representative Homer D. Angell, Oregon Republican, read in the House tables showing Bonneville's scheduled installation of generators and summarizing existing and anticipated power loads. Listed among "present" prime power contracts in this table is 100,000 kw. to supply a "defense load request from one of the principal American metal companies now supplying the bulk of metal to the airplane industry."

Including this 100,000 kw. the table calculates "total in sight" load by July 1, 1941, as 277,650 kw. and draws the conclusion that with only 194,400 kw. installed capacity Bonneville will be short of power at that time. It is considered unlikely, however, that all of the "in sight" demand, even if it materializes, will be required by July 1, 1941. And, although the tables make no allowance for it, huge blocks of Grand Coulee power will become available in 1941.

Boeing Sued by Seattle City Light on Contract

Suit to compel the Boeing Aircraft Co. of Seattle to purchase all its electric light and power from Seattle City Light has been filed in King County Superior Court. City Light asserts Boeing Co. is under contract to purchase solely from the municipal utility for a 10-year period which began in April, 1936.

It is stated City Light has expended $24,390 in purchasing and installing new equipment to serve the needs of the Boeing Co. P. C. Spowart, manager of City Light Sales and Construction Division, said the court action after "all reasonable attempts at settlement of the matter" have been unavailing and because City Light feels it lies in the public interest to protect the city's rights.

Racket Exposed by Better Business Bureau

Issuance of a permanent injunction against the operators of seven household appliance stores in southern California as the result of a suit filed by the Better Business Bureau of Los Angeles, recently terminated a merchandise check racket which has been running for over a year.

These firms used merchandise checks as business lures to obtain patronage. They mailed thousands of letters to persons who registered at movies and elsewhere. An accompanying letter congratulated the receiver on his or her good fortune at having been selected to receive a Merchandise check for $50 "which may be used the same as cash for any refrigerator, gas or electric range, or combinations of washer, ironer, radio or vacuum cleaner."

Complaints soon came into the Bureau that out-of-date merchandise was being sold or offered, that merchandise checks had sometimes been sold to them outright by other "lucky" individuals.

Weekly sales of $15,000 had been enjoyed by this group which called themselves Consolidated Appliance Dealers of California. Following the issuance of a temporary injunction, the defendants said sales were off $75 a day.

Stores participating in the distribution of the phony checks were Davis Electric & Radio Co. in Los Angeles and Eagle Rock; Lovinger's Radio & Appliance Co. (two stores), Thrifty Appliance & Radio Co. and C. C. Bobsene Appliance & Radio Co., Santa Monica.

PG and E to Offer Extended Service In Shasta Area

Representatives of Pacific Gas and Electric Co. told the directors of a tentative rural public utility district the power company contemplates offering extended service to rural residents in the section east and west of Redding.

The directors stated they wish to have assurance their districts will be completely served and at proper rates before they abandon their plans of creating a public utility district under the REA program by which they would be loaned the money with which to build their own lines.

D. S. Aiken, division sales manager, and Alexander Seidel, sales manager for the P. G. and E., said that in addition to granting of recent applications for the construction of an 18 mi. line through Bella Vista and Ingot and a 20 mi. line as far west as Ono the company has approved lines to Oak Run and to South Palo Cedro and is considering a line in the Cow Creek section.

● Seattle's Board of Public Works has approved a $141,225 expenditure for a transformer unit for the Seattle-Tacoma tie-line for interchange of power between the two municipally owned light and power systems. The unit will be purchased jointly with the city of Tacoma. The Board has also approved specifications for insulator installation and a new cross-arm construction, increasing the capacity of the line from 60,000 to 110,000 volts.

Hermiston Sale to Pacific Power Approved

Sale of the properties of Hermiston Light & Power Co. to Pacific Power & Light Co. has been given final approval by the securities and exchange commission and the actual transfer of the ownership completed according to George T. Bragg, vice-president and general manager of Pacific Power.

Previously approved by Public Utilities Commissioner Ormond R. Bean. the transfer will add approximately 850 customers to the company's lines. Communities served by the Hermiston company are Hermiston, Echo, Umatilla, Stanfield and adjacent rural areas.

Because of the Pacific company's greater financial resources and power facilities, Commissioner Bean stated in his order that it was in a position to serve customers in the Hermiston territory on a more economical and satisfactory basis than the smaller company was likely to be able to do.

The Hermiston company has recently been operating under a trusteeship.

Personnel of the Hermiston company will be taken over by the Pacific company. John A. Clarke, who has been manager of the property, will continue as local manager.

Power facilities in the district will be rehabilitated and improved under the Pacific company's ownership, Bragg stated.

San Diego to Build New $3,000,000 Power Plant

With construction of an $850,000 high tension line to provide a reserve power capacity from Boulder Dam expected to be completed by December, the San Diego Gas and Electric Co. has undertaken studies for a complete new power plant costing more than $3,000,000.

W. F. Raber, president of the company, today announced that need for such facilities by 1943 to accommodate an anticipated population growth and expansion of national defense forces in San Diego requires immediate preliminary planning.

Government Suggests Sabotage Defenses

Electrical men concerned with serving munitions plants are reading a memorandum issued by the Army, setting forth suggested defense precautions. Compliance is at present voluntary, and the proposals are directed at new plant construction. But the information applies to all who seek to make their plants more impregnable.

Proposals include: (1) two-source power—where twin facilities from commercial sources are not available, ultimate installation of standby generating plant; (2) underground equipment—including situation of such outdoor equipment as transformers and oil switches in subterranean vaults; (3) black-out facilities—involving ventilation for sealed plants, and light fixtures designed to accommodate blue covers.

Indirectly, electrical facilities are involved in the recommendation that, where practicable, operating facilities be established in complete units, so that destruction of one key unit will not stop operation of an entire plant.

Bureau of Reclamation to Build New Oregon Power Plants

Plans and specifications will be ready shortly for building additional power generating units at The Cove, on the Deschutes river north of Redmond, Commissioner John C. Page of the bureau of Reclamation promised delegates of the Central Oregon Irrigation district at the meeting of the national reclamation association at Great Falls, Mont., last month.

The Cove power plant is designated for improvement at an estimated cost of $180,000. Power to be generated there is to be used to reimburse the Pacific Power and Light Co. for power which will be lost at their Bend plant when water storage begins in the new Crane Prairie and Wickiup dams on the upper Deschutes.

Immediate construction of the Cove plant has been urged by the Redmond Chamber of Commerce and irrigation officials here on the grounds that it will release additional water for irrigation purposes.

● Plans for the construction of an extension of Tacoma's City Light service to residents of American Lake north, and the area between Lake Steilacoom and Gravelly Lake and south of Lakewood Center, is planned by the Tacoma city council. The project will require the expenditure of $120,000 for the transmission lines and the sub-station, it is stated.

Columbia Power Authority Made Permanent Body

Legislation creating a permanent Columbia Power Administration to operate Bonneville and Grand Coulee and with authority to take over entire utility systems, was introduced in the House last month, the natural sequence in the New Deal plan to carve another TVA in the Pacific Northwest.

The legislation gives the proposed CPA authority to buy or acquire distribution systems, including generating plants, and to sell such systems to public agencies providing electric service as substitutes for private companies. Chief objective is the acquisition of Puget Sound Light & Power Co., which Washington's quarreling PUD's have been unable to purchase, singly or together, at their own terms. The proposed CPA, incidentally, would be a regional agency in the Interior Department, not independent such as TVA.

Introducing the bill, Representative Charles H. Leavy, Washington Democrat, had printed in the Congressional Record a long letter from Secretary Ickes approving the measure and stating that President Roosevelt has approved its objectives. The bill, prepared by the Interior Department, was rushed into the House hopper before election in the hope it would defeat Public Initiative 139 in Washington State next month but without any expectation of Congressional approval in the future.

Raver Authorizes 230,000-Volt Line

Bonneville-Grand Coulee Power Administrator Paul J. Raver last month authorized immediate construction of a 230,000-volt power transmission line between Grand Coulee Dam and Puget Sound and a major substation at Covington near Tacoma, Wash.

Raver's action followed swiftly upon advice from Washington that the President had signed a deficiency appropriation including an additional $3,850,000 for the power administration's construction program. "Specifications for equipment and materials already have been prepared in anticipation of the appropriation, and will be released immediately to bidders," Raver said.

The new line will total 183 miles in length. It will bring power in almost a direct line across the northern half of the State of Washington to the large substation which is to be constructed at Covington, a town in the Puget Sound area. Feeder lines from the Covington substation will serve the cities of Seattle and Tacoma, both of which now have power interchange contracts with the power administration.

● San Francisco will be the focal point from June 16–20, 1941, of a flow of engineers, manufacturers, industrialists, and others who will be interested in heating, ventilating and air conditioning. The Pacific Heating & Air Conditioning Exposition will be held in the Exposition Auditorium in the Civic Center at that time. Coincidental with this, the summer meeting of the American Society of Heating & Ventilating Engineers and the Heating, Piping, & Air Conditioning Contractors National Assn. will be taking place.

PG and E Rates Down $5,000,000

Apportionment of a $5,000,000 reduction in rates of the Pacific Gas and Electric Co. — effective last month throughout the company's system—was detailed by the State Railroad Commission recently.

Customers in the San Francisco Bay Metropolitan Area, according to the commission "breakdown," will save approximately $2,000,000 annually.

The electric rate reduction will strike an average cut of 5 per cent per customer.

In San Francisco alone, domestic and commercial customers of the company will save $1,232,840 annually—$388,920 of it in electric bills.

In the East Bay cities of Oakland, Berkeley, San Leandro, Piedmont, Albany and Emeryville, the annual saving will total $246,760 for electricity.

Seattle Area Plagued With Lightning

A thunder storm burst over Seattle last month and lightning bolts struck power circuits in at least four places in and near the city.

One of the towers carrying Puget Sound Power & Light Co. current over the Lake Union ship canal at Fremont was reported hit by lightning in spectacular fashion.

The lofty tower, on the south side of the canal, was struck on a crossarm almost at the top. For perhaps two minutes a bluish flame like an arc light burned brilliantly high among the steel girders of the tower, while molten yellow bits dripped down inside the structure.

The company also received a report that lightning had struck a power line near Renton, and that a circuit on Harbor Island was out.

City Light received reports that current was broken in two or three small areas in the south end of the city, possibly through the burning out of transformers. Lights in downtown office buildings flickered two or three times during the storm.

Los Angeles Council Blocks Mayor's Appointees

Efforts of Mayor Fletcher Bowron of Los Angeles to fill the vacancies in the Board of Water & Power Commission made by the recent resignations of Watt L. Moreland and F. D. Howell have met with consistent opposition from a majority of the city council. On his return from Australia, Mayor Bowron submitted the names of Ross St. John McClelland, retired, and John R. Richards, director of the Metropolitan Water District.

Richards was objected to on grounds of possible conflict between the interest sof the two boards, offered to resign from Metropolitan Water District if appointed, but still was not affirmed by the council

As Oct. 17 drew near the situation grew critical. A quorum was needed to pass on acceptance of an offer from Harriman, Ripley & Co. and Lehman Bros. for refinancing of $42,592,000 of Power Bureau revenue bonds at 2.86%, making a saving of $4,800,000 in interest charges. Commissioner W. R. Fawcett was in New York on personal business. The commission could not legally act without a quorum of three. The council refused to act on the new appointment so in the nick of time Fawcett flew back from New York, cast his vote, and saved the bonds. McClelland once engineer for Electric Bond & Share Co., is now a rancher.

Bend (Ore.) Committee Fights PUD

"Citizens Committee Against the $2,000,000 Power District" made its appearance last month in Bend, Ore. A. O. Schilling of Bend will serve as head of the committee to oppose the proposed PUD district for central Oregon. Irving D. Brown, also of Bend, is secretary.

The committee, said Brown, "opposes the proposed $2,000,000 power district as an unnecessary and duplicating development, and as a certain cause of substantial tax increases without any assurance of lowered rates or improved service."

● Public Utility District Assn. of Washington, A. G. Ziebell, chairman, has declared that operating employes of the Puget Sound Power & Light Co. will be retained by the PUD's if the properties of the company are taken over. This is considered a settled policy of the association, Ziebell said.

● The Los Angeles Spring Market has been tentatively scheduled for Jan. 27 to Feb. 1, 1941.

Dependable grounds, YEAR AFTER YEAR

The thick copper exterior of a Copperweld rod, permanently molten-welded to the stiff steel core, prevents rusting—year after year. And, when a copper ground wire is clamped to a Copperweld rod with a Copperweld clamp, there are no dissimilar metals in contact—no galvanic action—and no electrolytic corrosion. For dependable grounds, year after year, make sure you have non-rusting rods and friendly metals in contact under the ground, by specifying Copperweld ground rods and clamps.

COPPERWELD STEEL COMPANY, GLASSPORT, PA.

Pacific Coast Representative: **C. E. INGALLS**
Rialto Building • San Francisco, California

COPPERWELD *Non-rusting* GROUND RODS AND CLAMPS

Clatsop County (Ore.) REA Assn. Buys Bonneville Power

The Nehalem Valley Co-operative Electric Assn. of Clatsop County, Ore., has signed a 20-year contract for the purchase of 150 kw. of power from the Bonneville-Grand Coulee power administration.

The Nehalem co-operative was the first REA project organized in the State of Oregon. It is the seventh to buy Columbia River power from the Government. The contract provides for first deliveries of electricity in the near future at the co-operative's substation at Olney, Ore.

The co-operative is now purchasing power from the Pacific Power & Light Co. which serves the Astoria area and which already has executed a contract for the purchase of Columbia River power to meet its increasing consumer demand in the area. This contract provides that the company will institute immediate deliveries to the co-operative until the power administration's 82-mi. transmission line, now under construction between Portland and Astoria, is completed.

Colorado Tax Commission Valuations Meet Objectors

The Colorado Tax Commission's 1940 valuations on electric and gas companies are unreasonable and confiscatory, the State Board of Equalization was told recently.

Fifteen electric and gas companies and four rural electrification co-operatives presented the board with a formal petition that charged the state with increasing their valuations while lowering those of other classes of property.

Using 1925 as a base year, the firms charged that electric firm assessments in 1939 amounted to $48,073,650, an increase of $11,347,210, or 130.9 per cent over the 1929 total.

Public utilities other than gas and electric companies were assessed less in 1939 than 10 years before, the aggregate valuation dropping from $199,680,180 to $143,987,355, the petition said.

Nevada-California Corp. Reduces Rates

Electric rates of Nevada-California Electric Corp. will be reduced, effective with meter readings of Nov. 4, to save customers in Perris, San Jacinto, Hemet, Elsinore, West Riverside and Corona $9200 annually, President Ray L. Riley of the California Railroad Commission declared last night.

Residential customers will receive reductions totaling $7,800 and commercial customers $1,400 annually, Riley said. The minimum charges in the communities will be reduced from $1.30 a month to $1.10 in incorporated areas, while in unincorporated areas the reduction will be from $1.50 to $1.30 a month.

Utah Power Sub Station Hit By Lightning

Residents of the east section of Salt Lake City were without electrical service for seven hours, Oct. 4, when lightning struck a substation of the Utah Power & Light Co. at Sugarhouse, suburb of Salt Lake City, at 3:30 a.m. causing the explosion of a 22,000-volt transformer and shattering two of the building's brick walls.

Excessive voltage of the lightning caused the transformer to burst, scattering oil throughout the building. Vapor from the oil exploded and pushed out the north and south walls. Charles A. Young, engineer and the only one in the building, escaped injury.

One hundred power company workers had improvised lines sending power to half the section cut off by 5:00 a.m. and by 10:00 a.m. all lines and equipment were again supplying current.

Seattle City Light Revenues at New High

According to a report filed with Mayor Arthur B. Langlie, and the Seattle City Council, revenues of City Light for twelve months ending Aug. 31 were $6,242,676.42, an increase of $143,334.28 over the corresponding 1939 periods. This, it was stated, is a new high for City Light.

Further, the report states, the kilowatt hours generated and exchanged for the same period were 540,170,000, an increase of 87,660,000 over the corresponding previous period. Kilowatt hours delivered at customers' meters increased 92,337,749 to a new record of 451,611,633. This is a 25.7 percent increase over the 1939 period. Meters on lines reached a new all-time high of 102,312, and ranges on the line reached a new mark of 39,629, an increase of 9.5 percent over Aug. 1939. Revenue for the month of August alone was $539,091.41, compared with $482,346.67 for August of a year ago.

● Cowlitz County PUD Board, Longview, Wash., W. A. Cardwell, chairman, plans calling for bids early in December for the construction of a $55,000 rural electrification line, which will run from the Kalama River district through the upper Coweeman River and Ostrander districts, to the Toutle country.

Pacific Power Seeks To Take Over Inland Power

Stipulation that the Pacific Power & Light Co. would not seek damages if the government at a later date takes over two power sites owned by the Inland Power & Light Co. was on file last month after a three-day hearing before a Federal power commissioner examiner on the Pacific's petition for permission to take over Inland.

Pacific, it was testified, owned all of the stock of Inland and proposed to take it over together with other property, including the licensed power sites at Ariel on the Lewis river in Washington and the Wallowa falls site on the Wallowa river in Oregon.

Government counsel inserted in the record of the hearing a contract by Ebasco Services, an Electric Bond & Share company affiliate, with Reid & Priest of New York to represent the Pacific in the case. Pacific and Inland are subsidiaries of the American Power & Light Co., an affiliate of Electric Bond & Share.

San Francisco Contractors To Study Calif. Act.

Possibilities of operating under the California Unfair Practices Act are to be explored by the San Francisco Electrical Contractors Assn., Inc. after a special called meeting of the association Oct. 17. Report on the operation of the plan in Long Beach for over a year brought forth a motion to go into the program in San Francisco.

An impartial survey of overhead, or cost of doing business, will be conducted by a firm of certified public accountants to determine the average overhead upon which courts will be asked to judge whether or not any complained-against contractor is selling below cost. Under the plan charges are brought to the district attorney for prosecution under the Unfair Practices Act.

● Telluride Power Co. has started construction of a modern office and warehouse at Gunnison, Utah, according to Paul Ashworth, assistant to H. B. Waters, president and general manager for the company. The structure will be approximately 26 by 70 ft. and will be complete some time in December at a cost of $8,000.

● The Seattle City Council utilities committee has concurred in a recommendation of the Board of Public Works that an ornamental street lighting system be built in Green Lake Way, from North 57th Street to Aurora Avenue. Cost, estimated between $36,000 and $50,000.

Huge Falls Created At Boulder Dam

For almost two hours Boulder dam's great man-made "Niagara falls" was turned on and off at the will of bureau of reclamation officials, thrilling thousands of visitors amassed on top of the dam to view the magnificent spectacle.

Downstream from the dam, from valve houses located on the Arizona and Nevada sides of the Colorado river, 11 of the 12 huge needle valves were turned on to release 30,000,000 gal. of water in a cascade of white spray. Viewed from a plane, which carried newspaper reporters, photographers and radio officials and announcers, the water show was spectacular.

In the white spray which shot to great heights, innumerable rainbows extended from the center of the stream back to the walls. The spray extended the length of the canyon from the valves to the outlets of the diversion tunnels, used to divert the Colorado river during construction of the dam, located half a mile below.

During an annual test recently of the needle valves in the canyon wall outlet work just below Boulder Dam, majestic plumes of water shot from all but one of the outlets with this beautiful result

PG and E to Build $1,000,000 Substation

To meet anticipated demand for electric energy throughout its system, Pacific Gas and Electric Co. will immediately double the capacity for the interchange of power with Southern California Edison Co. by increasing facilities at Magunden Substation in Kern County and by building a new substation, costing approximately $1,000,000 on the Kings River near Piedra in Fresno County. Work on the new substation and a tie line to connect it with the substation at Sanger started Oct. 4. Plans provide for the completion of the job by July 1, 1941, according to PG and E officials.

In approving the application for an increase of the interchange capacities between the two companies, the California State Railroad Commission pointed out that the project "offers the most favorable plan for the maximum utilization of Central Valley power from Shasta when the same becomes available."

The Commission found that an increase in the production capacity of the Pacific Gas and Electric Co. is necessary because of load growth, and that it might be met either by building new generating plants or by purchasing electricity from the Edison company, which is in a position to supply it from its Big Creek plants and other plants adjacent to the San Joaquin Valley.

The new interchange agreement provides that the Edison company shall make available to PG and E 150,000 kw. for the years 1941, 1942, 1943, and 1944, and that PG and E shall have an option to purchase 100,000 kw. during the year 1945.

The two companies have been cooperating in the interchange of electric energy since the first agreement was approved by the Commission in September, 1936, when an interchange of 40,000 kw. was provided for. This agreement, originally planned to continue for ten years, or until June, 1947, was later supplemented by a year-to-year agreement providing for the delivery to the Pacific Gas and Electric Co. of an additional 35,000 kw. of assured capacity, making a total of 75,000 kw. available until the new order becomes effective.

Montana Power Line to Be Completed by 1941

Completion of the construction of the 277-mile, 160,000-volt power transmission line from Anaconda to Grace, Idaho, is expected by the end of this year, according to Frank W. Bird, president of the Montana Power Co. The new transmission line will tie together the Northwestern inter-connected electric power system in Montana, Oregon and Washington with the system in Utah and Idaho.

Announcement of the expected completion of the line which has been under construction for some time was made in New York last month by C. E. Groesbeck, chairman of the board of directors of the Electric Bond and Share Co., to the stockholders at their annual meeting.

Contracts Awarded

To I. & E. Construction Co., Minneapolis, Minn., for construction of 186 mi. of transmission line and electrical equipment for the North Douglas Electric Cooperative, $140,441.

To J. E. Chandler, of Arcadia, Calif., by the Bonneville Administration for construction of the St. Johns-Astoria, 115 kv. transmission line, a distance of 82.2 miles, $135,855.

To Fritz Ziebarth, Vancouver, Wash., for construction of a 30-mile stretch of 115,000 volt Bonneville power line between Yakima and Ellensburg, $39,452.

To J. J. Agutter, Seattle, bidding $38,400. $47,900 submitted the low bids to the Seattle Transportation Commission for the electrical contract on the new shop and service building being built on Airport Way and Atlantic Street for the Commission.

To Yakima Electric Co., Yakima, Wash. for construction of 75.5 mi. of power line from Toppenish to the Wapato and White Swan districts. Award made by the Benton Rural Electric Assn., Prosser, Wash., $60,560.

To General Electric Co., Seattle, for furnishing a 15,000 kva. generator for the Priest Rapids Irrigation District, White Bluffs, Wash., $23,835.

To the Pennsylvania Transformer Co., for furnishing three large transformers for the city of Tacoma's end of the Seattle inter-tie, $104,910.

To Jarvis-Firth Electric Ltd., Vancouver, the electrical contract in connection with the $175,000 project now under construction at Coal Harbour, Vancouver. This project includes erection of a hangar and numerous buildings of wood construction, to provide temporary accommodation for the RCAF.

Leadership in Action!

1940—A YEAR OF BROKEN RECORDS FOR FRIGIDAIRE SELLING MEN!

Greater leadership in sales! The sale of more than 600,000 Frigidaire refrigerators in 1940 sets an all-time high in refrigerator sales records.

Only great public confidence in the merit of Frigidaire could make this all-time record possible. Such wide-spread customer acceptance makes selling easier.

A sound sales-winning program. In 1940 Frigidaire dealers had the dream of every selling man—outstanding products; the leading name in the industry; sensational low prices; constant, forceful advertising; and sound, effective selling plans.

Only men of broad vision and long experience could have produced such a program. These men support the Frigidaire dealer with but one idea—to help him sell more Frigidaires.

Industry's largest factory. In 1940 Frigidaire dealers broke selling records month after month. Yet despite record-breaking volume, the most popular models were always available when needed.

Only a plant as large and as flexible as Frigidaire's could meet dealers' demands for more and more products. For example, refrigerator production was stepped up and maintained at the impressive peak rate of more than 3 new Frigidaire refrigerators a minute.

The right models at the right time! Appealing new models were introduced at strategic times during the selling season to increase even further the dealers' competitive advantage.

Only manufacturing capacity and flexibility that gear in with merchandising problems quickly can keep a selling organization in the strongest competitive position.

Leadership is not taken lightly at Frigidaire. For we know there is no easy way to continued success.

We look upon leadership as an *active* selling force . . . a spring-board to new and greater accomplishments. This concept of leadership is reflected in the extra selling advantages built into every Frigidaire refrigerator, electric range, and electric water heater. It is reflected in the extra value they offer to the customer. It is reflected in every activity of an aggressive, experienced factory and distributor personnel that works in closest cooperation with a wide-awake, alert dealer organization.

Thus is created a leadership in products, production and plans that automatically makes for leadership in sales. As proof, every Frigidaire selling record was broken in 1940. Again, Frigidaire Dealers capitalized on the selling power of Leadership in Action!

NOW— What about 1941?

It's going to be another big year for Frigidaire! Inside and out, the great new lines of Frigidaire appliances will offer sensational new advantages, planned to stimulate buying interest to new heights. Advertising and selling plans will be hard-hitting, aggressive and sales-producing! Again in 1941 Frigidaire Dealers will "cash in" on the increased selling power of an even greater Leadership in Action!

Frigidaire—AMERICA'S FAVORITE

FRIGIDAIRE DIVISION, GENERAL MOTORS SALES CORPORATION, DAYTON, OHIO

Frigidaire Electric Appliances • Refrigerators, Ranges and Water Heaters

PG and E to Establish Power Line for Cabin Owners

Board of directors of the Sacramento Junior Chamber of Commerce has gone on record commending the Pacific Gas and Electric Co. on its proposal to establish a power line serving the cabin owners in the American River Canyon.

A resolution endorsing the project and praising the power company was adopted last month.

It was brought out that the P. G. and E. has made a survey and is preparing an application to be presented to the California Railroad Commission for permission to install the line at a cost of $150,000.

Some 700 summer cottages and resorts would have the service available to them. Under the tentative plans of the P. G. and E., regular domestic rates plus a 33 per cent surcharge would be applied to the cabin owners.

Officials of the company have stated the extra charge is necessary because of the high cost of installation in the mountainous territory and because most of the customers would use the electricity only on a short seasonal basis.

P. G. and E. representatives said it would take more than a year to obtain rights of way and construct the 38 mile line.

Whatcom County (Wash.) PUD Must Pay $50,000 Fee

According to a ruling made by Federal Judge John C. Bowen in Seattle, Whatcom County PUD No. 1 must pay the Federal Court a $50,000 fee when and if the district takes over the Whatcom County properties of the Puget Sound Power & Light Co. at the $5,000,000 price fixed on the properties by a jury last summer.

The fee is levied under an old statute, allowing the Court a 1 per cent commission on all moneys disbursed through the registry of the court. The district had petitioned for permission to make payment direct to the company, to escape this fee, but the Court denied this petition. It is believed likely the district will include the fee in a proposed bond issue to finance the purchase of the system, if and when it is purchased.

Lewis County (Wash.) PUD Legality Questioned

A memorandum decision in Lewis County Superior Court, Chehalis, Wash., rendered by Judge J. M. Phillips, opposed the contention of the plaintiff in the case of the state against Lewis County PUD No. 1, that the district was established illegally, due to the fact that Centralia, a municipal corporation, is already owner of a hydro-electric system, a gravity water system, and an irrigation system.

The law states, according to the decision, that no public utility district shall include a municipal corporation, where such municipal corporation owns all utilities authorized in the district. Centralia should have been excluded from the district at its inception, Judge Phillips decided, and Centralia citizens should not have participated in the election establishing the district. PUD officials state the case is being appealed.

New Lighting System Planned For Reno

Reno's electrical power rate will be lower next year when the new proposed "white way" lighting system is installed, if a proposed rate, approved by the council and the Sierra Pacific Power Co., is approved by the Nevada Public Service Commission.

The suggested rate, prepared by the power company, was approved by the council last month. The rate, because the city will use more power when the "white way" system is installed, will be lower. Actual payment of power bills, however, will be higher.

Council members and power company officials are now completing plans for the installation of the "white way" system, which is expected to be installed completely by the end of the year.

A new type of standard will probably be used for the lighting system, according to Chester Dormio, chairman of the council light committee. The new type will be constructed in the form of an "L," with the light suspended in such a manner that more light will be thrown on the street. The standards now in use have lights set squarely at the top.

The extension of the system has been studied by the council for several years, but funds were not appropriated for the purpose until this year's budget was drawn up.

Lincoln County (Wash.) PUD Files Supreme Court Appeal

Lincoln County, Wash., PUD, at Davenport, Wash., has filed notice of appeal to the State Supreme Court from the decision handed down Sept. 5 by Superior Judge Fred Witt of Spokane, granting the Washington Water Power Co. and others a permanent injunction, preventing the PUD from taking over public property in Grant and Spokane Counties. The PUD sought to include company property serving 136 customers, in Grant County, and 84 in Spokane County.

● PRODUCTION of electric energy for public use during August, 1940, amounted to 12,202,371,000 kw.-hr. according to a recent FPC report. This represents a 10.4 per cent increase when compared to August, 1939. Average daily production of electric energy for public use was 393,625,000 kw.-hr. during August, which is 2.9 per cent more than the average daily during July, 1940.

REA Activities

TO SANDBERG & JOHNSON CONSTRUCTION CO., Hampton, Iowa, for building 180 mi. of line for the LaPalata Electric Assn., Durango, Colo. and the Rocky Mt. Engineering Co., $116,350.

POUDRE VALLEY RURAL ELECTRIC ASSN., INC., Severance, Colo., has been awarded $351,000 to build 388 mi. of line in Weld, Larimer and Boulder Counties.

KOOTENAI RURAL ELECTRIFICATION ASSN., INC., Coeur D'Alene, Idaho, has been allotted $20,000 for member service extensions.

MALHEUR COOPERATIVE ELECTRIC ASSN., Vale, Ore., has been awarded $72,000 to build 89 mi. of line in Baker and Malheur Counties.

OKANOGAN COUNTY ELECTRIC COOP., INC., Winthrop, Wash., has been awarded $85,000 to build and acquire 70 mi. of line in Okanogan County.

SOUTHEAST COLORADO POWER ASSN., La Junta, Colo., has been allotted $40,000 to finance the construction of 22 mi. of line.

PUBLIC UTILITY DISTRICT NO. 1, Chehalis, Wash., has been awarded $57,000 for the construction of a sub-station.

STONEWALL ELECTRIC CO., Sheridan, Wyo., has been awarded $50,000 to build 38 mi. of line in Sheridan and Johnson Counties.

FERGUS ELECTRIC COOPERATIVE, INC., Lewiston, Idaho, has been awarded $160,000 to build 173 mi. of line in Fergus and Judith Basin Counties.

MID-YELLOWSTONE ELECTRIC COOPERATIVE, INC., Hysham, Mont., has been awarded $52,000 to build 47 mi. of line in Rosebud County.

COOS ELECTRIC COOPERATIVE, INC., Coquille, Ore., has been awarded $107,000 to build 97 mi. of line in Coos County.

COWLITZ COUNTY PUD NO. 1, Kelso, Wash., has been allotted $10,000 for member service extensions.

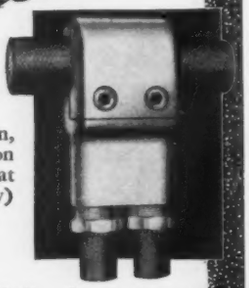
BRIDGER VALLEY ELECTRIC ASSOCIATION, INC., Mountain View, Wyo., has been awarded $30,000 for additional generating facilities.

RURAL ELECTRIC CO., Pine Bluffs, Wyo., has been awarded $164,000 to build 164 mi. of line in Laramie County, Wyo. and Banner and Kimball Counties, Nebraska.

LINCOLN ELECTRIC COOPERATIVE, INC., Davenport, Wash., has been awarded $10,000 for wiring.

HIGHLINE ELECTRIC ASSN., Holyoke, Colo., has been awarded $5,000 for wiring.

The MOST COMPLETE LINE OF
Tee Connectors



ALL good types —any size.

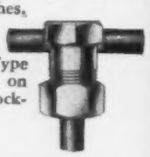
With a *hinged clamp* for the main, the Penn-Union Type HFM (at right, and below) is easy to apply.

Split sleeve contact unit gives permanent grip on branch.

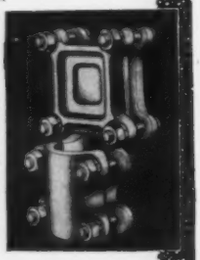
Made for single or multiple branch connections.

ALSO CABLE TAPS — a complete line of 90° and Parallel taps, for one or more branches.

COMPACT and POSITIVE. The Penn-Union Type SM gives equal tightening on the run and tap. Self-locking, dependable.



CLAMP TYPE TEES for all sizes of tubing and cable—a full line. Machined contact surfaces.



MANY MORE TYPES—for all combinatioas. For connecting flat bar, run or tap, to tubing or cable. Also "general utility" tees that take a wide range of conductor sizes. You will find that the Penn-Union line has *exactly what you need.*

FOR ANY CONDUCTOR FITTING—Terminals, Service Connectors, Studs, Two-Ways, Ground Clamps—see the THOUSANDS in the Penn-Union Catalog.

Preferred by the largest users, who have found that *Penn-Union on a fitting is the best guarantee of Dependability.*

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TRADE NOTES

Rockwell in Charge of Appleton Western Office

A. W. Rockwell, San Francisco, has been placed in charge of all western activities of the Appleton Electric Co. of Chicago. His territory covers the 11 Western states. Effective Oct. 1, Rockwell announced the appointment of Ed F. Conrad as manager of the Los Angeles branch.

Conrad will be remembered as former Pacific Coast manager of Square D Co., who was later transferred to managership of the Texas factory and for the past several years has been out of the electrical industry. Otherwise, the personnel of the western offices remains the same, according to Rockwell.

Bintz Co. To Build Salt Lake City Offices

W. H. Bintz Co., Intermountain refrigerator, radio, air conditioning and appliance distributor, has started construction of a modern warehouse and office building at 3rd South Street and Rio Grande Avenue in Salt Lake City.

Charles C. Bintz, company manager, says removal of the company from its present location, 579 West 2nd South Street to the new buildings will take place early in the new year and will mark the 50th anniversary of the organization. The buildings will provide 40,000 sq. ft. of office and warehouse space, costing $75,000.

Northwest Supply Montana Rep. for Pacific Electric

The Northwest Supply Co., Butte, Mont., has been appointed Montana representative for the Pacific Electric Mfg. Corp., according to Henry L. Brooks, sales manager.

Complete sales information and service for all products made by Pacific Electric are under the direction of Tim Sullivan and D. A. Nauck.

Headquarters are located at 909 East Second Street, Butte, Mont., with a branch at Great Falls.

● THE U AND I EXCHANGE, managed by Ray Bosworth, has recently taken on a complete Westinghouse line in Preston, Idaho. Hoggan Electric Co., run by Jim and Albert Hoggan, is another new electrical appliance dealer in Preston. They will handle a line of General Electric ranges, water heaters, refrigerators with a full line of small appliances.

● INTERNATIONAL APPLIANCE CORP., Brooklyn, N. Y., manufacturers of Broilking table broilers, has appointed Wallace R. Lynn Co., San Francisco, as agents for California, Nevada, Arizona and southern New Mexico. Charles C. DeBruler, Denver, Colo., will represent the line in Wyoming, Utah, Colorado and northern New Mexico. Northwest Sales, Seattle, continues in the Northwest.

● E. C. WENGER Co., Oakland, northern California distributors of Wilcox-Gay Recordios, recently held a showing of the new 1941 line in the Green room of the Western Merchandise Mart, San Francisco.

● NEWEST ELECTRICAL APPLIANCE DEALER in Provo, Utah, is Reed's Riteway Store. Manager by K. G. Grimm, the new department is handling a complete line of General Electric appliances.

● PHILCO DEALERS from eleven Western states convened in Salt Lake City recently to hear plans of the "Jubilee" sales promotion to be carried out from Oct. 1 to Christmas. Speakers included Tayre Ramsdall, John Ballantyne, E. B. Loveman, John Carpenter, James Carmine, Henry Paiste, all of Philadelphia and Cliff S. Bettinger of San Francisco. F. S. Walden of Strevell-Paterson, Intermountain distributor, was chairman.

● STUFFER ELECTRIC Co., electrical wholesaler, Seattle, has just leased a building formerly occupied by an automobile agency and has remodeled it for a new drive-in wholesale establishment. Recently appointed a distributor for General Electric appliances, this wholesale company also plans a large appliance display. The drive-in feature is new to the electrical wholesaling industry.

● NEW ELECTRICAL DEALERS in Spokane are R. W. and H. L. Spoonemore, who have recently opened their shop, "Spoonemore Electric," at 1906 N. Division. They feature Stewart-Warner electric ranges, refrigerators and radios. General Electric water heaters and standard lines of small appliances. The Spoonemore brothers also do electrical wiring and contracting.

● HARRY A. QUINN has been appointed assistant manager of the Reno Sears Roebuck store, according to Morris Stewart, manager. Quinn was formerly hard line supervisor of the Sacramento store and has been with the Sears organization for six years.

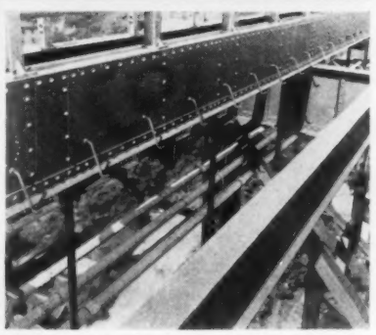
● NEW SALES PERSONNEL at Appliancenter, Lewiston, Idaho, includes Frank Harris, Guy Layton, Lardie Dodson, according to R. N. Largent, manager.

Facts You Can Use to Cut Distribution Costs . . . No. 2

No Protective Casing is needed when you install Transite Conduit underground or in exposed locations. It holds its true form under sustained earth loads and traffic pressure . . . is virtually unaffected by weather and corrosive fumes.

TRANSITE DUCTS CAN'T ROT!

In Multiple-Duct Systems, Transite Korduct permits using less concrete between ducts, for Korduct itself is like concrete. Cables run cooler . . . I^2R losses are reduced.



Made of asbestos and cement, Transite Ducts contain no metal or organic materials. They cannot rust, rot or decay under any conditions. Maintenance stays low.

ONCE A DUCT ROTS, there's nothing you can do but replace it. That's costly—and unnecessary. For you can eliminate such expense with J-M Transite Ducts.

Made of asbestos and cement, they are 100% inorganic . . . completely rot- and decay-proof. Being non-metallic, they are immune to electrolysis. Maintenance costs stay permanently low.

With Transite Conduit, you save all the expense of concrete, for this durable duct is so strong it needs no protection underground. Where "concreting-in" is specified, you cut material costs with Transite Korduct . . . thinner walled, lower priced.

Both Transite Conduit and Korduct are light in weight, easy to handle and assemble . . . assure fast, economical installation. For details, write Johns-Manville, 22 East 40th Street, New York, N. Y.

FOR EFFICIENT, LOW-COST SERVICE, SPECIFY...

JM Johns-Manville

TRANSITE DUCTS

TRANSITE CONDUIT... For use underground without a concrete envelope and for exposed locations.

TRANSITE KORDUCT... For installation in concrete. Thinner walled, lower priced, but otherwise identical with Transite Conduit.

● PAUL LEWIS, factory representative for Kelvinator, Inc., has returned to Detroit to assume another position with the company. Lewis's territory, the Pacific Northwest, showed the greatest increase of any section in the U. S. for Kelvinator sales. He will be succeeded by R. W. Poirson, former manager of laundry sales for Kelvinator.

● S. H. COUCH CO., INC., North Quincy, Mass., manufacturers of telephone and signaling apparatus, have appointed Nicholas & Cook, San Francisco as their sales agents in the Pacific West, according to J. E. Atkinson, vice-president.

● DELTA-STAR ELECTRIC CO., Chicago, have appointed the Stevens Sales Co., 41 Post Office Place, Salt Lake City, Utah, as sales representatives for Delta-Star products.

Moved

American Music Co. has moved from 330 So. Broadway, Los Angeles, to 426 So. Broadway.

Pacific Electric & Mechanical Co., from 524 Loews' State Bldg. to 400 So. Boylston, Los Angeles.

Walter West Electric Co. from 4973 W. Adams to 4825 Agnes street, North Hollywood, Calif.

Huntington Park Appliance Co., from 3457 Broadway, Huntington Park, to 6041 Carpenter Ave., North Hollywood, Calif.

ABOUT PEOPLE

George Hughes Given the James McGraw Award

George A. Hughes, chairman of the Edison General Electric Appliance Co., of Chicago, and often referred to as the "Father of the Electric Range," was

HUGHES

honored last month with the James H. McGraw award at an annual meeting of the National Electrical Manufacturers Assn. in New York.

This award was given "in recognition of Hughes' distinguished contribution to the advancement of the manufacturing branch of the electrical industry; as promoter of a broader service to the electrical home, pioneer of promotional rates for load building, creator of electric markets."

He began his career in the electrical industry operating small power systems in North Dakota and Montana. He became deeply interested in the possibilities of electric cooking. He moved to Chicago, set up shop and in 1910 produced the first commercially successful electric range.

He diligently pioneered the development of electric cooking through the improvement of range design, working in cooperation with other manufacturers, at the same time building public confidence in power companies themselves.

Judges who awarded the medal consisted of H. B. Crouse, president, Crouse-Hinds Co.; L. F. Adams, asst. of vice-president, General Electric Co.; Clarence L. Collens, president, The Reliance Elec. & Engraving Co. and Geo. C. Thomas, Jr., vice-president, The Thomas & Betts Co.

Hall Named New Radio Specialist for G-E in California

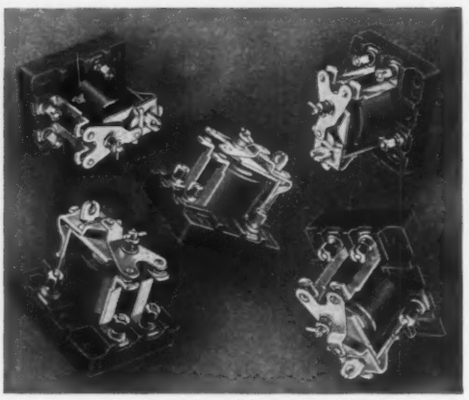
T. F. Hall, who has served during the past year as a member of the merchandising services staff of the General Electric radio and television department, Bridgeport, Conn., has been appointed field specialist in radio and television receivers and tubes for General Electric with headquarters in Los Angeles. His territory will include the entire state of California.

Prior to his service in Bridgeport, Hall had been radio field specialist for G-E southwestern district at Dallas since 1937, and before that radio, vacuum cleaner and refrigerator specialist with the G-E Supply Corp. in New Orleans and Los Angeles.

● S. H. HARRISON, who has been in the industrial sales division of the Westinghouse Seattle district for several years, has been transferred to San Francisco where he becomes Pacific Coast district resale manager. The position is a new one, created to conform with the new Westinghouse national resale program.

● JACK KELLY, factory representative for Edison General Electric Appliance Co., has returned to Montana after three years in the Salt Lake City office. Billings will be his new headquarters.

RELAYS viewed from every angle



CRISP ACTION. **The wiping action of fine silver to silver contacts keeps them clean.**

DEPENDABILITY. **Contacts never stick or become pitted. Hence no failure.**

DURABILITY. **The combination of sound design and careful construction with sturdy parts gives unusually long life.**

ECONOMY. **Even though the construction is sturdy, fine workmanship makes easy action without undue current consumption.**

The Ward Leonard Line comprises light, intermediate and heavy duty, sensitive, transfer, and thermal and motor-driven time delay types for every application. Send for bulletins describing relays of interest to you.

WARD LEONARD ELECTRIC COMPANY

48 SOUTH STREET MOUNT VERNON, N. Y.

Electric Controls Since 1892

NO CRYSTAL GAZING,

but we DO see into the future

Chemical and metallurgical research in cable materials predetermines operating behaviour of new designs and constructions

Behind the quality of Anaconda stands the painstaking and precise analysis of the trained engineer and research chemist. Searchingly, unceasingly, they gaze into the future . . . the future performance of every inch of Anaconda Wire and Cable . . . but *their* tools are the exact and unimpeachable instruments of science.

Their findings, with numerous other tests, both chemical and physical, unite to form a strict manufacturing control from which Anaconda develops new and better products to meet and exceed the ever-increasing needs and specifications of the customer. 40356

ANACONDA
from mine to consumer

Keen eyes peer through this metallographic microscope looking for flaws and weaknesses in metal samples. Only those that pass this man's expert scrutiny . . . those that measure up to Anaconda's standards . . . are passed.

A Wire and Cable for Every Electrical Requirement

The Anaconda line is complete, including standard and special power cables, rubber-covered wire, magnet wire and coils. Each product has benefited from Anaconda's continuous development and research program.

USE MODERN IMPROVED **Anaconda Wire & Cable**

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive
A Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities

Former Development League Staff Members In New Jobs

Following the closing of the Electrical Development League of Southern California, the staff of that organization has gone into various other activities. F. A. Hockensmith, general manager, is founding an independent factory representation sales service and continuing in the electrical industry.

Walter Stickel, in charge of adequate wiring promotion, has taken a position with the Los Angeles house of Leo J. Meyberg Co. as advertising and sales promotion manager.

Arthur Kempston, active on codes and ordinances, and adequate wiring promotion in Edison territory, goes with the Los Angeles office of the Pacific Coast Electrical Assn. to continue such work.

The League secretary, Miss Record, has secured a position with the Los Angeles Chamber of Commerce and the Bureau of Power and Light employees assigned to the League have returned to the Bureau.

● A. LINCOLN BUSH, president of Belmont Electric Co., New York, received the James H. McGraw Award for contractors for 1940. Presentation was made at the National Electrical Contractors' Assn. convention in Jacksonville, Fla., Oct. 23. The award was made in recognition of his contribution to the advancement of the contracting branch of the industry through long and consistent devotion to association work.

● CHARLES W. GOODWIN, JR., district manager, General Electric Supply Corp., San Francisco, recently disclosed the opening of a new showroom on the fourth floor of the Western Merchandise Mart, San Francisco. According to Goodwin, complete showings of the G-E radio and the many and varied lines of G-E home appliances will be maintained in the new showroom.

● WILLIAM GORDON has been appointed purchasing agent for the B. C. Electric Railway Co. following the vacancy caused by the death of the late A. C. W. Gage. He has been with the B. C. Electric for the past 33 years. His appointment is an important one as in addition to B. C. Electric buying he also handles the purchasing for the B. C. Motor Transportation Co. and other subsidiaries, spending over $4,000,000 per year.

● DAN H. HUTCHINSON has replaced C. E. Kirkpatrick at Graybar's Salt Lake City office. "Kirk" was recently installed as lamp and lighting specialist at the company's San Francisco division. Hutchinson was formerly associated with the Utah Power & Light Co. as manager of industrial sales.

● J. W. BAKER has been retired from the Southern California Edison Co. after serving for 26 years with the company. He entered the utility's employ in 1914 as an electrician, being promoted to district superintendent in 1927 for the Lancaster district, and transferring in 1930 to Oxnard where he was located until his retirement. He has been replaced by H. W. Ramelli.

● A. W. PRIDE, formerly district sales manager for the Westinghouse transformer and porcelain insulator divisions with headquarters at the Emeryville (Calif.) factory, has been relieved of all transformer duties and will confine his entire time to porcelain insulator sales. L. J. Conkel succeeds him as transformer sales manager.

Deaths

● EVERETT HICKMAN, 50, a long time resident of Fresno, and purchasing agent of the San Joaquin Power division of Pacific Gas & Electric Co., died Oct. 18 in Fresno of a heart attack. He had been a resident of Fresno since 1900 and a member of the power company since 1916.

● LESLIE COFFIN, 56, vice-president, Puget Sound Power & Light Co., died early last month from a heart attack in Wenatchee, Wash. After graduation with honors from Harvard in 1906, he went with Stone & Webster and in 1909 became manager for Puget Sound Power in Bellingham. Since 1931 he has served as a vice-president of the company. In 1935 his duties were enlarged to cover management of the division of power supply, which included control of the Rock Island, Baker River and Snoqualmie hydro-electric projects.

● E. E. GIBSON, western superintendent for the West Kootenay Power & Light Co., died recently at his home at Penticton, B. C., following a heart attack. He passed away a few days prior to his 62nd birthday. Mr. Gibson, as an electrical engineer, worked in Mexico and later in Arizona. In 1904 he joined the staff of the West Kootenay Power & Light Co. and was in charge of electrical service throughout the Boundary region.

● JOHN E. FAST, founder of John E. Fast and Co., Chicago, died recently at his ranch near Nogales, Arizona. For several years he had been in poor health, and, while maintaining his financial interest in the company, he was inactive in its management. He was graduated from Ohio State in electrical engineering in 1908, after which he went to Chicago and was employed by the American Telephone & Telegraph Co. In 1919 he founded the company that bears his name, and through which he pioneered many types of capacitors for the industrial and radio field.

● JAMES L. BEEBE, for many years salesman for Trumbull Electric Mfg. Co., died Oct. 7 at Seattle. He had been salesman in the Portland and Oregon territory.

Stocks at San Francisco
Electrical Specialty Co., Inc.,
316 Eleventh Street

Stocks at Los Angeles
Electrical Specialty Co. of So. Calif.,
451 South San Pedro Street

Stocks at Seattle
Electrical Specialty Co., Inc.,
714 Fourth Avenue

For the Coast Trade

At your doorstep you now have an adequate stock of popular D-H alloys, wires, ribbons, rods and other forms.

Driver-Harris Company
Harrison, N. J.

TRADE MARK REG. U.S. PAT. OFF.
Nichrome

Santa's been giving

GENERAL ELECTRIC
Appliances FOR YEARS

For many years old Kris Kringle has been filling thousands of requests for Practical Gifts with General Electric Appliances. Again this year with all the newly designed products being advertised by G.E., old Santa is bound to fill many of his Sentimental Gift requests with these famous appliances.

NATIONAL ADVERTISING AND PROMOTION

To make your job easier during the Holiday Season, G.E. is advertising these appliances extensively in LIFE, GOOD HOUSEKEEPING and the LADIES' HOME JOURNAL.

SPECIAL PROMOTIONAL PIECES

including displays, banners, folders and ad mats have been prepared for your identification during the Holiday Season. See your G-E Distributor early to get an adequate stock of merchandise and promotional materials.

SANTA'S CHECK LIST

Automatic Coffee Maker
Start it—Forget it
Completely automatic
Keeps coffee hot indefinitely
Price, $12.95

Automatic Moderne Iron
Lite-Weight—weighs only 3 pounds
New light that says "When"
"Dial the Fabric" control
Price, $8.95

Triple Whip Mixer
Powerful motor
Multi-speed control
Mixing bowl light
Price, $22.75 (complete with juicer)

Automatic Roaster
Tel-A-Cook light control
Adjustable cover vents
White enamel—18 quart capacity
Price, $27.95 (complete with utensils)

Automatic Toaster Set
Keeps toast in well or pops it up
Toast degree selector
Walnut tray with 4 colored dishes
Price, $19.95

GENERAL ELECTRIC
Heating Devices

APPLIANCE AND MERCHANDISE DEPT.
BRIDGEPORT, CONN. ONTARIO, CALIF.

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PROFILES OF THE MONTH

John D. Underhill, vice-president, Okonite Co., was recently tendered a dinner on the occasion of his fifty years of service with Okonite

George Knowles, sales engineer, Canadian Telephones & Supplies Co., Ltd., was recently elected president of Vancouver Electric Club

Howard G. Dodge has assumed his new duties as head of the Underwriters' Laboratories San Francisco office, replacing Kenneth W. Keene

John N. Barker has joined the Pacific Coast Merchandising Division staff of Westinghouse Elec. & Mfg. Co., headquarters in San Francisco

Presenting the Adequate Wiring Committee of the Rocky Mountain Electrical League—(standing, left to right) Herman Bischofberger, John M. DePue, Alvin A. Sihler, George E. Lewis, John A. Baker, Ralph E. Johnson, T. M. Foulk; (sitting) E. M. Rowland. Their work has been outstanding

Preview of coming campaigns by

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

ELECTRIC APPLIANCE SOCIETY OF NORTHERN CALIFORNIA

COMMANDS MORE SERVANTS THAN ALADDIN'S LAMP

ELECTRIC APPLIANCE SOCIETY OF NORTHERN CALIFORNIA

Electric Range and Water Heater Promotion

A campaign timed to coincide with and help dealers merchandise our recent electric rate reduction. ☆ **$3,000.00 cooperative advertising fund to pay 1/3 of dealer space costs, and so induce them to use more newspaper ads.** ☆ Other special features including additional trade-in allowances. ☆ **All together, an outstanding promotion and a sure bet to repay a dealer's cooperation.** ☆ See **your** range and water heater distributor at once.

NOV. 4 to DEC. 25

DEALERS: By watching this page from month to month you can keep informed of sales promotional campaigns to be sponsored by the Pacific Gas and Electric Company and the Electric Appliance Society. Detailed information will be supplied, as usual, through the mail. If such information is not received, call our local office or write Electric Appliance Society, 1355 Market St., San Francisco, Calif.

EW 111-1140

MORE OUTLETS NEEDED

Inadequate wiring in the home is as inconvenient and unhandy as inadequate plumbing. And, with more and more electrical servants being developed each year, the promotion of adequate home wiring is becoming increasingly important to the entire electrical industry. An inadequately wired home is a daily source of annoyance to the owner and a poor market for the appliance dealer. The maximum use of electricity and maximum appliance sales can be obtained only by seeing that there are plenty of conveniently located electrical outlets in every home.

SOUTHERN CALIFORNIA
ALL-WINTER
SUN FESTIVAL

PACIFIC COAST ELECTRICAL BUREAU

601 WEST 5TH STREET LOS ANGELES • 447 SUTTER STREET SAN FRANCISCO

CERTIFIED ADEQUATE WIRING

11-40